
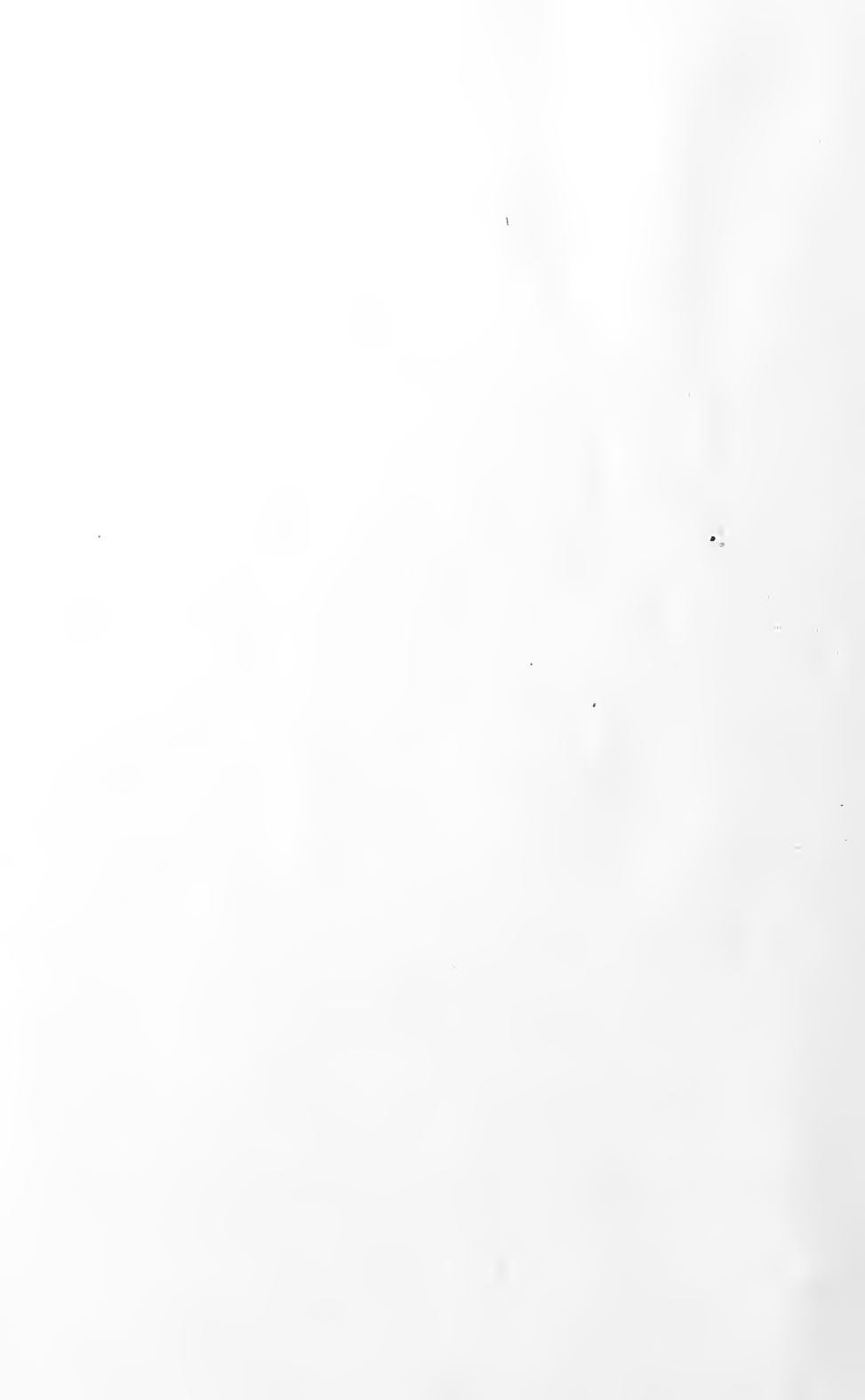


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The Friedlander Company
Chicago, Illinois
U. S. A.

CATALOGUE No. 3

of

Electro-Therapeutic Apparatus

X-Ray Tubes, Shields
Fluoroscopes
Etc.



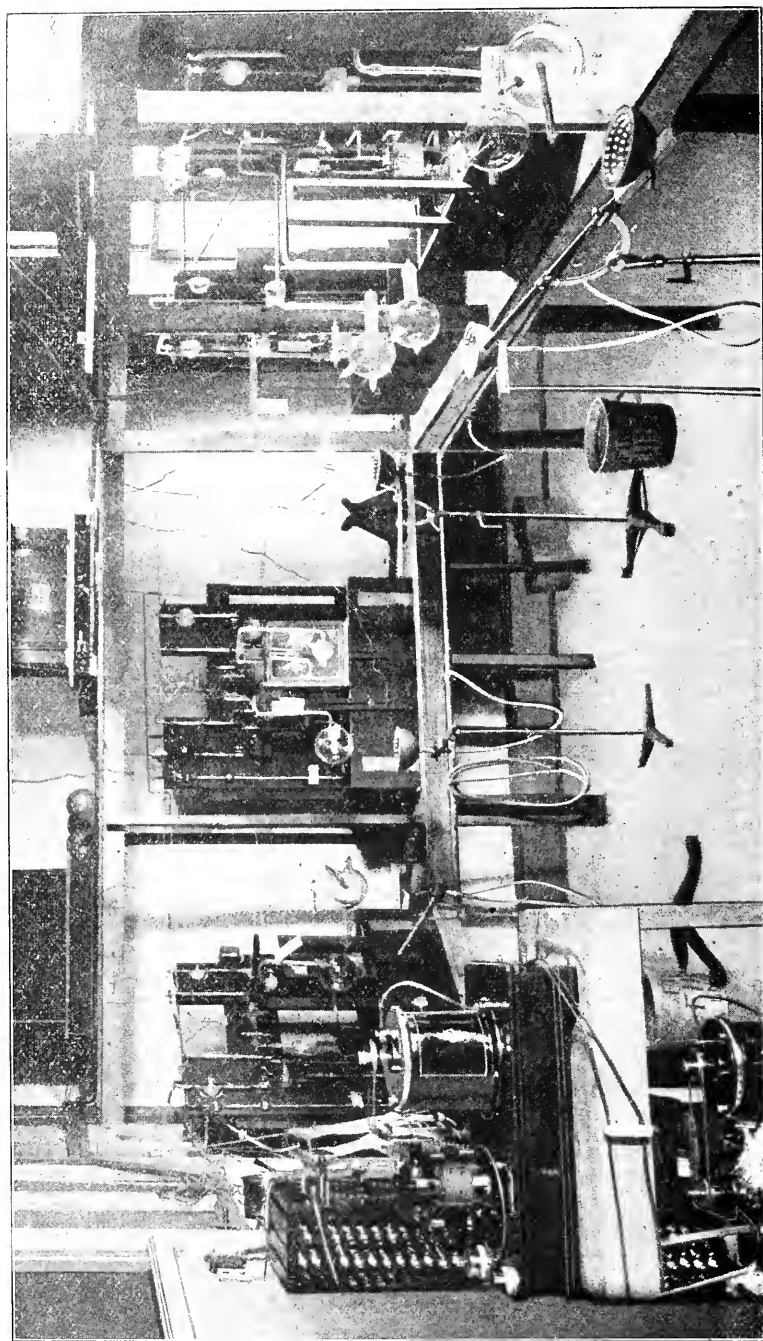
Trade Mark

The Friedlander Company
Manufacturers
Chicago

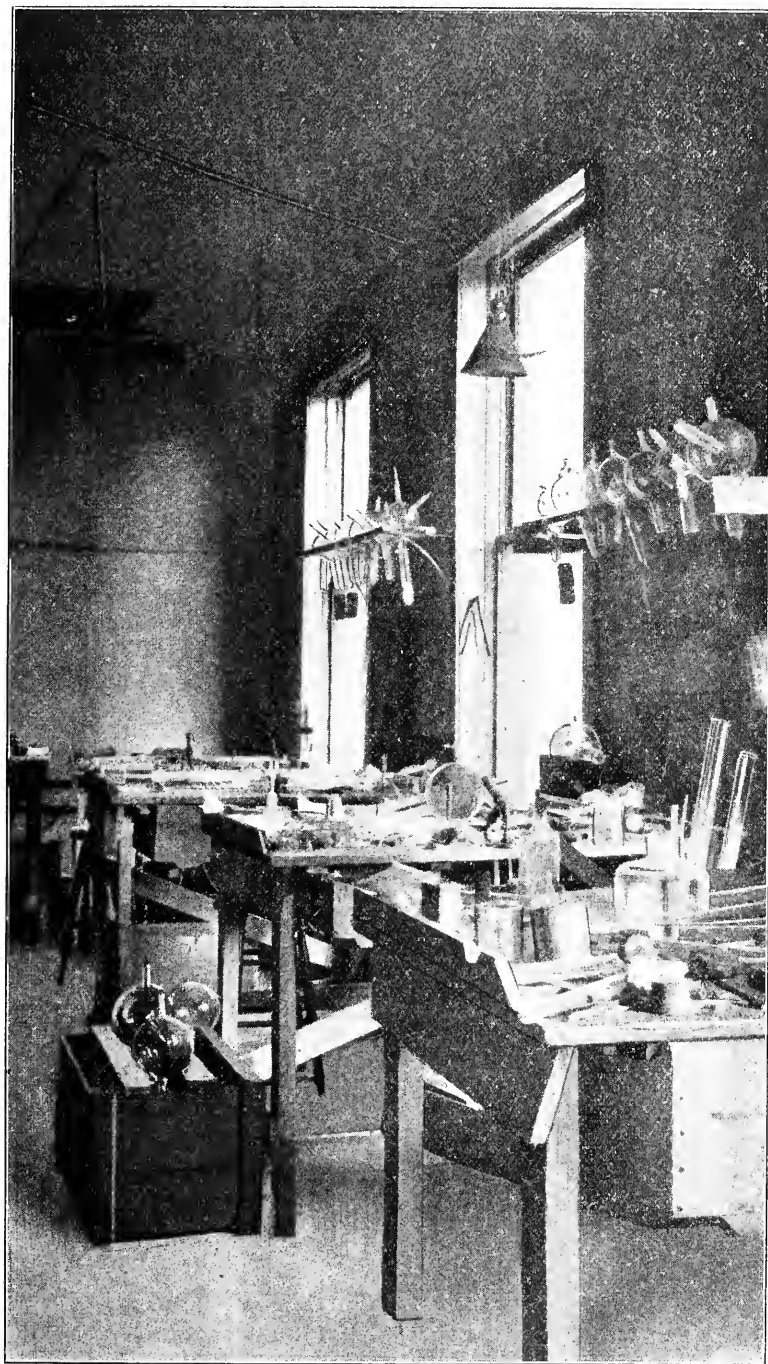
New York

Berlin

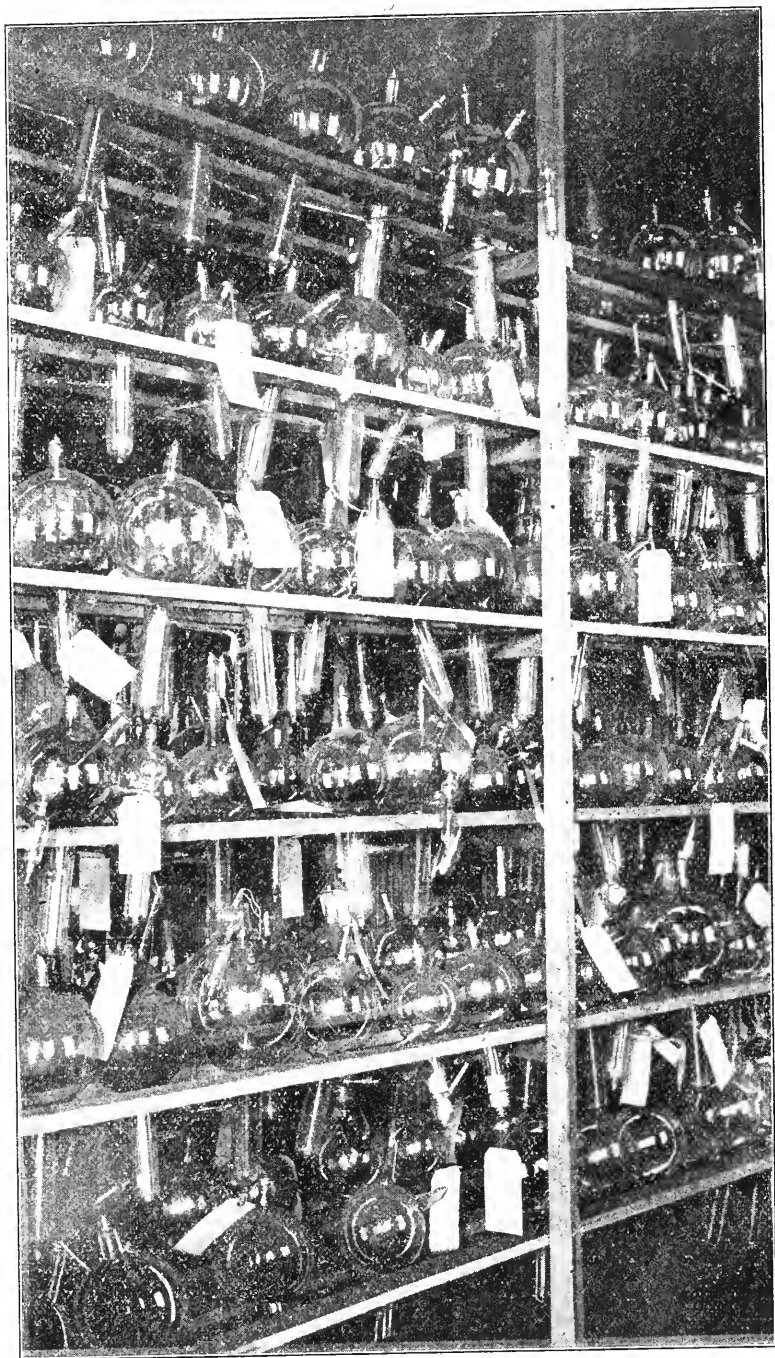
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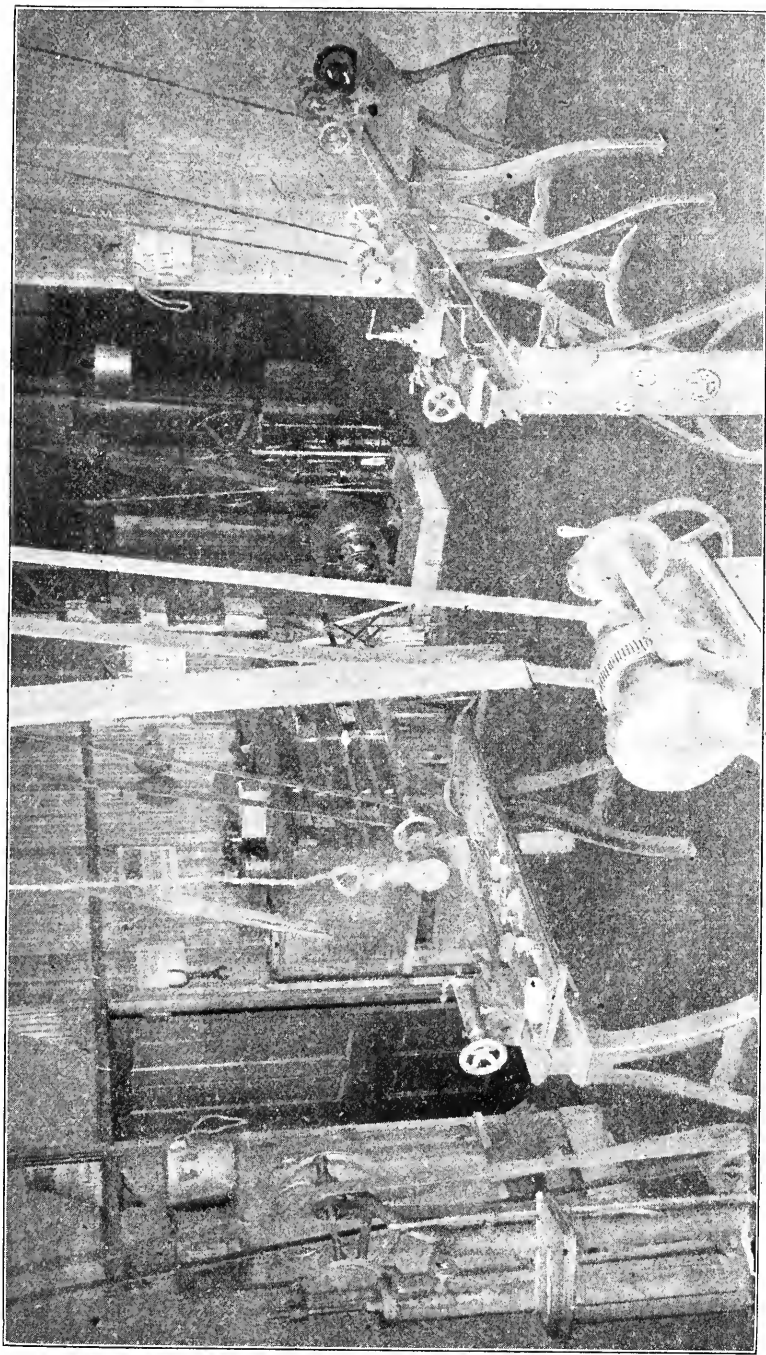
Exhaust Room of The Friedlander Company



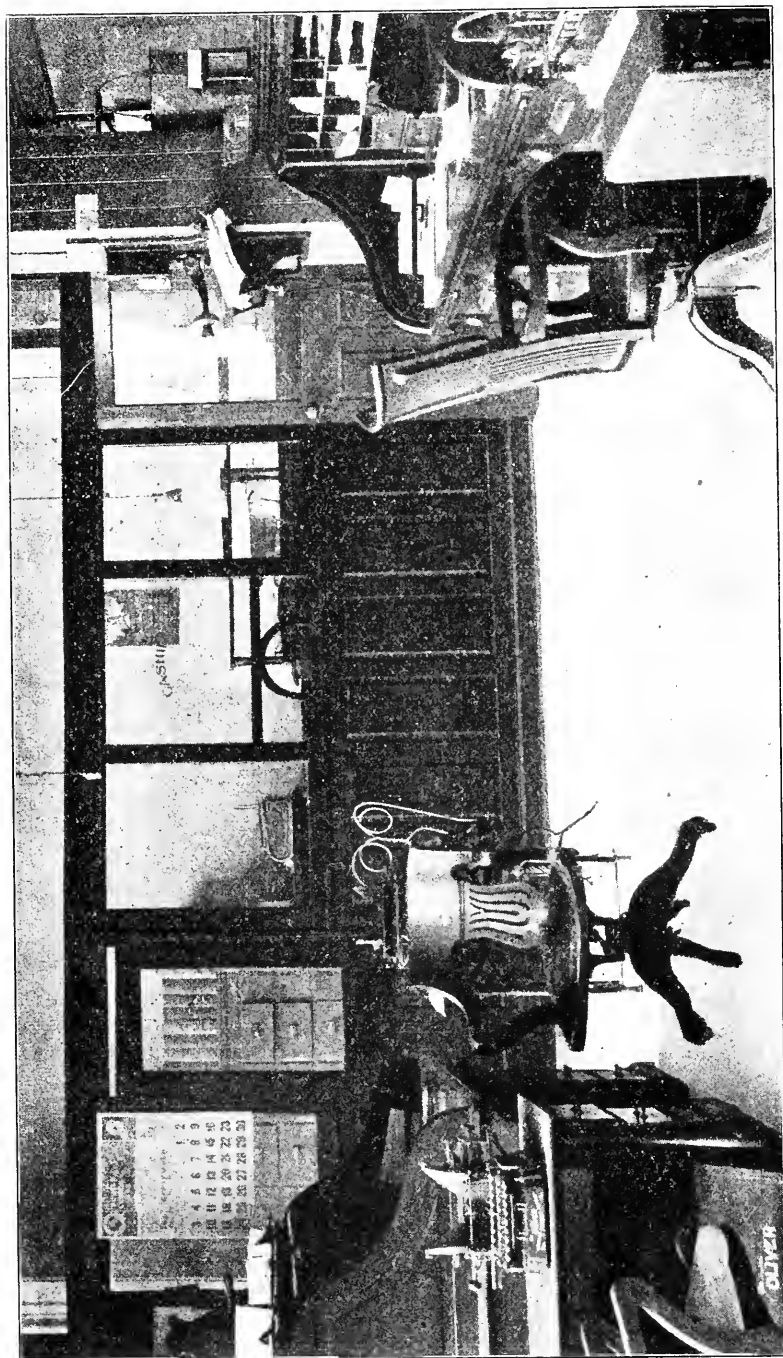
Glassblowing Shop of The Friedlander Company



A corner in the Glassblowing Plant of The Friedlander Company



Machine Shop of The Friedlander Company



Office of The Friedlander Company

To Our Patrons

Announcement



IN presenting this catalogue to our many friends of the medical profession, we do so with a certain degree of gratification, as we believe that during the past ten years in which we have been importing and manufacturing X Ray tubes, we have been enabled to place within the hands of the X Ray specialist, X Ray tubes of a standard that are today recognized as second to none, both as to results obtained from their use, as well as in the careful and mechanical construction for which our goods are noted.

The perfection in the R. F. Tube has only been accomplished by the untiring energies of Mr. Robert Friedlander, who immediately after the discovery of the X Ray by Professor Roentgen, began the importing of X Ray tubes.

The faulty construction that was apparent in the early type of X Ray tubes, the loosening of the tips, uncertainty of the focus, the constant raising of the vacuum of the tube during use, without means of controlling the same, caused Mr. Friedlander to begin experimenting and improving these tubes, until his efforts have been rewarded by producing a type of tube, which for their excellency in finish, accuracy in focus and ease of regulation, is so well known that a detailed description is not necessary.

The United States Government also recognizing these facts, has granted him ten patents upon various tubes and accessories.

In 1902, in order to carry out our experiments as well as to manufacture goods closely allied and in fact accessories to X Ray apparatus, we opened a manufacturing plant, which from year to year has been added to and at the present time our glass blowing department where we manufacture X Ray tubes, high frequency electrodes, etc., is the largest and most complete of any in the United States. Our double mercury and mechanical pumps are of the improved German type, our workmen being the best and most scientific and men who have had special training along this line of work, thereby enabling us to manufacture any form of X Ray tube or electrode that a physician may require for the special cases that present themselves and this we are able to do on short notice.

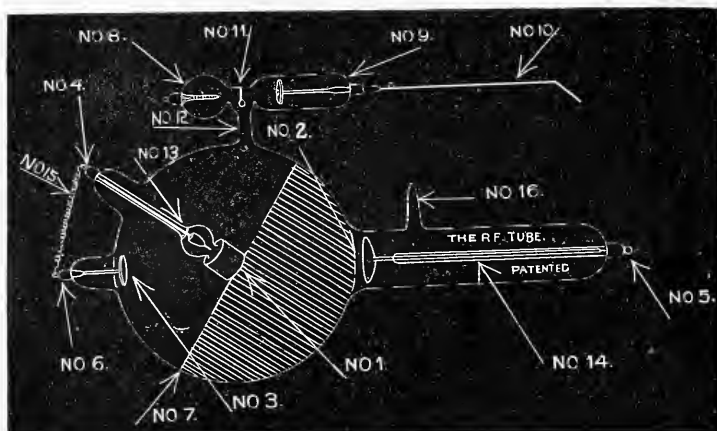
Our manufacturing departments are always open for the inspection of the physicians, whom we are pleased to have visit us, and we believe that by so doing, they will obtain useful knowledge that it would be impossible to acquire in any other way.

Electro-Therapeutic Apparatus

On account of our close association and dealing with the medical profession we are constantly asked for catalogs of various electro-therapeutic apparatus and, therefore, to enable us to accommodate our patrons, we have listed a most complete line of goods of various manufacture, which thoroly covers the field of electro-therapeutic practice.

The goods listed have been carefully selected. They are of well known merit and fully guaranteed as to perfection in workmanship, material and finish by the various makers, to which we add our personal endorsement and assure our patrons that we shall use every endeavor to fill orders for these goods which are intrusted to us, in the same careful and conscientious manner that it has been our custom to employ in our dealings of the past.

Chart of an X Ray Tube



While we recognize the fact that every practitioner who handles the X Ray knows all particulars regarding an X Ray tube, we, nevertheless, feel that for the benefit of the beginner it is necessary to print this little chart, so that he may familiarize himself with the names of different parts on an X Ray tube.

- No. 1. Anti-Cathode or Anode Surface.
- No. 2. Cathode Surface.
- No. 3. Anode or Assistant Anode Surface.
- No. 4. Sealing-in point and cap of Anti-Cathode.
- No. 5. Sealing-in point and cap of Cathode.
- No. 6. Sealing-in point and cap of Anode.
- No. 7. Hemisphere of X Ray.
- No. 8. Heightening Device on Regulator or Auxiliary Anti-Cathode.
- No. 9. Lowering Device on Regulator or Auxiliary Cathode.
- No. 10. Movable Swivel on Regulator.
- No. 11. Wall between Universal Regulating Device.
- No. 12. Connection from Main Bulb to Regulating Device.
- No. 13. Glass Rod back of Anti-Cathode.
- No. 14. Glass Rod back of Cathode.
- No. 15. Wire between Anti-Cathode and Anode.
- No. 16. Exhaust Tip.

The X Ray and X Ray Tubes

Discovery of X Rays ; Early History ; First Focus Tube ; X Ray Tubes of the Present ; What Constitutes a Good X Ray Tube ; Regulating Tubes and How Regulated ; How to Raise the Vacuum of the Friedlander Tube ; Non-Regulating Tubes ; Appearance of the Light in X Ray Tubes ; Punctures ; Vacuum of X Ray Tubes ; Methods of Judging the Vacuum ; New X Ray Tubes Distance of Tube from Apparatus ; X Ray Tubes for Therapeutic Use.



LITTLE did Sir William Crookes, the physicist, think in 1879, while experimenting with various vacuum tubes, which now bear his name, that within his reach lay dormant an energy of light that has since revolutionized, to a great extent, the practice of medicine in certain diseased conditions, which a quarter of a century ago would have been deemed impossible.

Following Crookes' experiments, Lenard, a Frenchman, in 1893, while experimenting with cathode rays, recognized new radiations of light, but was unable to isolate them and it remained for Professor Roentgen, of the University of Würzburg, to give to the world his discovery of radiant energy known as X Rays.

It was in the month of December in the year 1895, while Roentgen, at work in his laboratory, attempting to develop photographic plates, noticed that the plates were fogged and presented outlines of objects foreign to what he anticipated, which fact greatly mystified him. A few days later, while experimenting with a Crookes' tube, which was without a metallic window and enclosed within a cardboard box, he observed that a quantity of barium-platinum-cyanide crystals near at hand, fluoresced and became luminous. This led to his discovery that a new form of light emanated from every part of the walls of the Crookes' tube, which was within the field of the cathode rays. These rays, while not visible to the naked eye, had the power of penetrating objects heretofore known as opaque. It was also noted that this new energy was transmitted in straight lines and that it was not possible to refract or reflect it in any way. Not being able to account for the various phenomena of radiation, he gave it the name of X Ray, signifying the unknown ray.

Professor Roentgen immediately made known his remarkable discovery, and in all parts of the civilized world his experiments were afterward reproduced.

Mr. F. C. Knott, of Boston, was among the first in this country to take up the study and constructed his own tube and made the first negative, January 26, 1896. This tube resembled in shape a tomato, the coil used being one of a four-inch spark gap, the skiagraph being of the hand, which was given an exposure of twenty-five minutes.

The early experiments were all conducted with the Crookes' tube, which was long and pear-shaped, and it was not until June, 1896, that Jackson, of England, constructed the first focus tube. It was then demonstrated that the focus tube was destined to be the proper type for the production of

X Rays, and in looking back over the score of years just passed, hastily glancing at the various kinds of tubes that have been offered and comparing with the perfect specimens of today, it is safe to say that in no other line of scientific instruments has the advance been so pronounced and rapid and which even at the present time so taxes the ability of the manufacturer as does the making of good X Ray tubes.

X Ray Tubes of the Present

X Ray tubes of the present day are all of the same type. The bulb is a perfect sphere and has a diameter of from three to eight inches. The cathode stem, being the long extension, is readily recognized; the cathode disc is concave, so that the rays are brought to a sharp focus, which impinge upon the anti-cathode, the terminal suspended in the center of the bulb. The anti-cathode is placed at an angle of forty-five degrees that the X Rays may be thrown from the tube, for at this angle it leaves a large, unobstructed field of rays for use. The other small terminal within the bulb is called the anode. Its use is to act as an equalizer of the current, and tubes equipped with this terminal will work better, wear longer and retain a more even vacuum than when this terminal is missing.

What Constitutes a Good Focus Tube

A good focus or X Ray tube must be made of the best and strongest of glass, free from imperfections, yet so thin that all the X radiance is freely allowed to penetrate the walls of the tube. The base of the glass must be a sodium or potassium salt and not lead, which no matter how slightly used, will cut off some of the desired rays. The anti-cathode must be heavy enough to withstand the powerful discharge from the source of electrical energy and the cathode terminal perfectly curved and focused upon the anti-cathode, so that no cathode rays may pass by and impinge upon the walls of the tube. The metals used in construction must be such that the occluded gases may be drawn out during the process of exhausting the vacuum, or otherwise as soon as current is turned into the tube these gases would be driven off and the vacuum lowered so rapidly that the tube would be valueless for either skiagraphic or fluoroscopic work.

The tips, which are a constant source of annoyance with many X Ray tubes, as they readily become loose and drop off, should be so annealed with the glass that this cannot happen.

A regulator should be provided for raising or lowering the vacuum by means of the current as generated by the various forms of electrical energy without the aid of artificial heat. The swivel attachment for retaining the vacuum at any desired point, in accordance with the distance it is placed from the cathode terminal are all excellent points.

The Friedlander tubes possess all these qualifications, most of which are original. Our extensive and ever-growing business is proof that our efforts are appreciated by the X Ray operators of the world.

Regulating Tubes

Regulating tubes are best for all classes of work and for use with any form of X Ray apparatus. An X Ray tube with use constantly becomes higher in vacuum and after a time, if the gases which are burned out cannot be replaced, it will be found impossible to light it up. This last condition is also due to the fact that molecules from the metal terminals within the tube have been driven off and found a resting place around the inside of the

bulb, and the current always taking the shortest, or course of least resistance, will follow this metallic path from the cathode to the anode terminal rather than pass through the path of higher resistance between cathode and anti-cathode terminals.

To overcome this and to renew the gases within a tube, it must be accomplished by some substance which readily gives off hydrogen or oxygen, as carbon, mica, potassium, manganese or by allowing air to pass through a heated metal tip by the law of Osmosis. Of those mentioned, carbon and mica are best, for in case the tube should become punctured or injured in such a manner that it has to be opened and re-pumped, carbon and mica will not become moist or absorb moisture from the atmosphere, whereas, tubes when opened with regulators of potassium or manganese, the salts readily become deliquescent, the anti-cathode and cathode discs rust from exposure to this chemical moisture, which greatly prolongs the operation of re-exhaustion, and in many instances good tubes have to be discarded from this cause as it is impossible to overcome the effect the air has produced upon these regulators.

How to Regulate X Ray Tubes

In all regulators for reducing the vacuum of X Ray tubes, except those provided with the Osmo Regulator, the *negative* current is used. The manner of reducing is to connect the anode terminal with the positive conducting cord from apparatus, and the regulating salt or element, with the negative conducting cord from apparatus. Care must be exercised in not allowing the current to act too long upon the regulator, as gases are given off freely. On some X Ray tubes a wire swivel is provided which can be brought very close to the cathode tip, which allows the current to jump from the cathode tip over the short air gap, thus acting upon the regulator, producing results exactly similar as when direct contact is made, although this process requires more time in which to accomplish the result.

In tubes, the vacuum of which is lowered by the law of Osmosis, heat by way of flame must be applied. The Osmo regulator consists of a hollow palladium wire sealed tightly within the cathode stem of the X Ray tube. The free, exposed end, is capped with gold, so that no air can pass through and into the X Ray tube under normal conditions. When the vacuum is to be lowered, a lighted taper or alcohol flame is held in close contact to the palladium until it becomes red hot. The flame is then removed and the palladium allowed to cool, when it will be found that the heat has slightly expanded the pores of the metal, a small quantity of air has been admitted within the X Ray tube, which has materially lowered the vacuum. This process of lowering the vacuum should be accomplished while the tube is in operation.

The palladium wire is protected by a glass covering which must be removed during the application of heat.

To Raise the Vacuum of the Friedlander Tube

The vacuum of the Friedlander Universal Regulating Tube can be raised by attaching the positive conducting cord from apparatus to the tip affixed to the auxiliary bulb that contains the small spiral of platinum wire, on the main X Ray tube. The negative conducting cord from apparatus being connected to the cathode terminal of the X Ray tube. Apply the current

from three to ten minutes, depending upon the nature of the generating apparatus and the condition of the vacuum. Make the usual connection to the anode of the X Ray tube and the vacuum will be considerably higher. This is accomplished by the positive current from the apparatus, causing a vibration to take place in the platinum spiral, which vibration draws the molecules of free gas or matter from the body of the main tube. These particles find a resting place on the walls of the smaller bulb, and being drawn from the large bulb, of a necessity causes the vacuum to become higher.

How to Regulate Non-Regulating Tubes

X Ray tubes that have no auxiliary regulator, can be manipulated to a certain extent, by observing the following suggestions. When a tube is first purchased it has the anode and anti-cathode connected by a suitable wire. On making the usual connections from apparatus, the vacuum of the tube will be found to give satisfactory results for some time. If the tube begins to get high in vacuum, remove the connecting wire between anode and anti-cathode. Connect the positive conducting cord from apparatus direct to the anti-cathode terminal, the cathode terminal connected as usual. It will be observed that the vacuum is lower. If the vacuum is still too high, or after using connected as described until it again becomes high, connect the positive conducting cord from apparatus to the anode, the cathode terminal connected as usual, and the vacuum will be found to have lowered. The explanation of this is, that by removing the connecting wire and making connection to each terminal as described, the positive current, acting upon the terminals singly, forces out the occluded gases from the metals, which find a place within the vacuum of the tube. This continues until all gases have been driven off and burned out by use, when the tube can be re-pumped or baked.

The baking process is not recommended, as many times the tube, in cooling, will crack and thus become entirely useless.

The process of baking is accomplished by wrapping the tube in asbestos, placing the same in an oven and gradually apply heat to about 400 degrees Fahrenheit. Withdraw the fire, allowing the tube to remain in the oven until it becomes cool.

Good results can also be accomplished by heating the tube carefully over a gas range, turning the tube constantly so that all parts will be exposed to the heat, and allow the tube to cool before using.

The baking or heating does not in reality renew or lower the vacuum of a tube. What is accomplished is that the minute molecules of metal that have been driven off from the terminals and lodged upon the inner walls of the globe, are loosened up and drop into the vacuum, thereby overcoming the tendency of the current to short circuit around the inner walls of the tube.

A large magnet, if applied and moved over the outer surface of the X Ray tube, will also have the effect of loosening this metallic deposit and renew the working of a tube for some time, but it will be economy in the end if, when a tube reaches this stage, it be sent in and the vacuum re-pumped, when the tube will be equal to new.

The vacuum of all X Ray tubes when low can be raised by reversing the current, that is, causing it to flow in the wrong direction, temporarily making the anti-cathode the negative and the cathode the positive terminal.

This causes no injury to the X Ray tube and the process should be carried on from five to fifteen minutes.

On account of the small amperage that is generated with a static machine, it will require longer to raise or lower the vacuum of X Ray tubes than if coils are used for this purpose.

Do not wait until the last moment to regulate the vacuum of your tube, but give it attention from day to day or from week to week. The tube and regulator will wear longer and accomplish more than if allowed to reach an extreme and then forced at once from a high to a soft or medium vacuum, or vice versa.

How an X Ray Tube Should Appear When Working Properly

The light in an X Ray tube when the same is working satisfactorily should have the appearance of an apple-green or a dense, heavy yellowish color.

The hemisphere should be well defined, and only that part parallel with and in front of the anti-cathode, should be illuminated. The X Ray will then give good penetration and definition. The fluoroscopic picture will be clear and distinct and you are assured of having good results for either therapeutic or skiagraphic work. On the other hand, if the whole globe is aglow, the light irregular and unsteady, having the appearance of a figure 8, a reflection being cast along the cathode stem back of the curved disc, the current is reversed. The fluoroscopic picture will be nil and no result from the ray can be realized.

Punctures

If the rays of light within the bulb of an X Ray tube appear of a rich purple hue, or if a discharge between the cathode and anode is constant, resembling a flash of lightning and a noise is heard while this discharge takes place, the tube is punctured, that is, a small hole or leak has been made through the bulb and air has rushed in and destroyed the vacuum. Care should be exercised to keep the conducting cords taut from the tips of the tube to a spreader on the tube stand, not allowing the cords to sag and be in close contact to the tube, for it is known that an electric current always takes the shortest route between points. If a tube is high in vacuum and offers great resistance to the passing of the current between the cathode and anti-cathode, and the distance between a sagging cord and the bulb of the tube offering less resistance, the conducting cords poorly insulated, the current is very apt to leap from the cord to the bulb or regulating device, which are not strong enough to withstand bombardment from without as well as within, and the result is a crack or puncture. Defective conducting cords are probably the most common cause of puncture. Metallic parts which are forced off from the metals within the tube, and which being constantly in motion in the path of the current, strike the walls of the tube.

Foreign bodies in the air of the room in which an apparatus is working, may be attracted, drawn against the bulb and likewise produce a puncture. This is especially true when static machines are used as the generating power. The large amount of electro-static current thrown off from the various parts of the machine covers a wide range and acts as a magnet, and you may have noticed that the face of a patient will be covered with dust or black particles absorbed from the air during static treatments.

Improper clamping of the X Ray tube in the stand is frequently the cause of puncture, especially when the tube is held by the small glass extension to be found on the cathode stem. This extension is known as the seal-off and is the point at which the vacuum of the tube is exhausted, and was never intended to be used for supporting a tube in operation.

The proper way to hold an X Ray tube is with a curved clamp fitted with a screw. The clamp firmly grasping the cathode stem, permits of no loose contact point and if the tube is held between this seal-off and the bulb, the tube will be found to be nicely balanced and easily manipulated.

A punctured tube need not be cast aside as useless for it can be repaired and made equal to new, providing the bulb is not cracked for any great distance. In cases of this kind the old terminals, if they are in a good state of preservation, can be used and placed within a new bulb.

Vacuum of X Ray Tubes

The vacuum of an X Ray tube is said to be hard, soft, high, medium or low. This pertains to the degree of penetration of the ray emitted, the terms hard or high vacuum being synonymous, and likewise a soft or low vacuum.

A low or medium vacuum will show the bone detail much better than a high vacuum and should always be used for fluoroscopic examinations or skiagraphs of the extremities and chest. A tube a trifle higher in vacuum must be used for abdominal work as the parts are much more dense and offer a greater resistance to the passing of the X Ray.

In the making of skiagraphs it will be found best to use a tube with a soft or medium vacuum, expose a trifle longer and get what is sought upon the plate, than to use a tube of greater penetration which would pass through the bony structure or object sought and make an indistinct image. We must not forget that the art of skiagraphy means dealing with shadows, and it is the shadows of the bony structure or object that we desire and are seeking upon the plate or fluorescent screen.

Methods of Judging the Penetration of Tubes

The old and most simple method of testing the vacuum of an X Ray tube is by judging the appearance of the bones of the hand with a fluoroscope. When the bones appear very dark and show a good contrast with surrounding parts, the vacuum was said to be low or soft. When the bones appeared gray and some of the detail lost, the tube was said to be of a medium vacuum, and when the bones appeared white, flesh and bone showing but little contrast, due to great penetration of the parts by the ray, the tube was said to be hard or to have a high vacuum.

This process, while accurate, is a very dangerous one as past experience has shown, for by constant exposure to the ray, the nails become brittle and crack, the skin on the hand soon begins to manifest a redness or dermatitis, small verruca appear upon the surface and the epithelium undergoes rapid changes from lack of nutrition.

The spark length of coils and static machines have also been used for judging the condition of the vacuum of tubes. The tube being properly connected to the apparatus, the current is permitted to pass into the same. The measurement is accomplished by the sliding rods of a static or terminals of a coil. If the current, while passing into a tube, will not jump or back up more than two inches between terminals, the tube is said to have a low

or soft vacuum. Any distance from two to four inches between terminals means a medium vacuum and from four to six inches or more designates a high or hard vacuum. These estimates also are crude and cannot be depended upon. The Walter skiameter offers an ideal and conservative manner of judging the vacuum. Its use is a safeguard against disastrous results to operators. The vacuum of tubes can be accurately noted and the expense so little that it is not wise to attempt to get along without it.

New X Ray Tubes

When X Ray tubes are first sent out by the manufacturer to dealers and physicians, they are soft in vacuum and should not be used at once for making skiagraphs of the denser structures, where it is necessary to make long exposures or to force a heavy current through them.

New tubes should be used for therapeutic work or making fluoroscopic examinations of the extremities until the vacuum becomes seasoned, when, after a few hours of this work, they will be ready for use with any apparatus, and no current used judiciously will break down the vacuum.

New tubes need nursing to the point for which the work in hand is required and when this point is reached, the operator need have no fear of pushing them to the limit.

X Ray tubes, the bulb of which is from six to eight inches in diameter, will be found best for all classes of work.

It is always best to have several tubes working and to allow each tube a period of rest between exposures, as by so doing, the life of a tube is greatly prolonged and the operator always prepared against loss from accident to the tube, which might cause him inconvenience at the crucial moment.

Distance of Tube from Apparatus

The X Ray tube should be placed at least six feet from the apparatus. Especially is this true when used with a coil. The coil being an electromagnet, there is a tendency for the cathode stream within the tube to be attracted and drawn from its course. Should this result, however slight, the accurate focus of the tube is effected and a sharp, distinct image cannot be produced. Instances of this character have been noted when the cathode stream has been drawn aside and impinged so strongly upon the walls of the tube that the glass directly in the path of the cathode ray has melted, causing a puncture to occur and rendering the tube valueless.

If the operator will guard against conditions destined to cause disaster, and profit by the suggestions herein given, he will be able to carefully manipulate his tubes and bring them to such a standard of perfection that his work will be the envy and admiration of his lesser informed associates.

X Ray Tubes for Therapeutic Use

X Ray tubes for therapeutic use should be of a soft or medium low vacuum and the tube placed so that the anode is from fifteen to twenty-five centimeters (six to ten inches) from the diseased area. Exposure to the X Ray from three to ten minutes and in no instance longer than this; a seance given every second or third day if possible. It is best to begin with short exposures and gradually lead up to the full limit, watching carefully for the first signs of a redness of the skin, and as soon as a redness is noticed, discontinue treatment at once until the irritation has entirely

passed away. It is better to give short exposures with a tube in close proximity, than long exposures with the tube at a distance.

The idiosyncrasy of the patient has much to do with the time limit, as it will be observed that blonds are much more susceptible to the ray than brunettes. The X Ray is used largely for treating superficial lesions, and a tube must be used that will carry the ray directly to the part and not farther into the tissue than the root of the diseased area. Tubes of high penetration carry the ray beyond this point and deep into the surrounding tissue, thereby effecting an area that does not require treatment and in many instances cause unpleasant symptoms, while the diseased area, not responding as quickly to the treatment, shows no apparent result.

A soft or low vacuum tube is also rich in chemical rays and physicists are as yet undecided as to whether or not it is the chemical rays rather than the X Rays that has done so much for the advancement of X Ray therapy.

The X Ray in Medicine

The use of the X Ray for diagnosis and in the treatment of various skin disorders and diseased conditions, is advocated today by the most conservative members of the medical profession.

It is always best to refer operable cases to the surgeon, and the X Ray will be found a most useful adjunct for post operative work. In cases of advanced carcinoma, where operation is not possible, the application of the X Ray will alleviate the pain, kill the disagreeable odor, and stop the bleeding. Excellent results are obtained from the ray in cases of skin cancer and, all in all, its use is a blessing to humanity afflicted with this dreadful disease. The use of the X Ray is advised in all cases of Epithelial Neoplasms, diseases of the Pilo-Sebaceous System, diseases associated with Seborrhoea, Pruriginous Dermatitis, Specific Micro-Organism, Tumors of the Lymphatic System, and on new growths of Connective Tissue. As a diagnostic agent it reigns supreme. Enabled as we are to examine parts which have heretofore been hidden from our view, it brings to light conditions which might escape the eye of the practiced diagnostician. It makes plain and confirms the proper reducing of fractures, the location of foreign bodies and assists the work of the practitioner so that the beginner is more sure of accuracy and success in his cases than the one who has devoted years of his life to the training of his faculties to judge conditions by the sense of touch.

Insure Your Tubes Against Breakage During Shipment

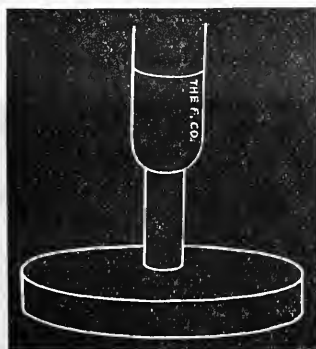
All X Ray Tubes are shipped at the risk of the buyer, but through an arrangement made with a large insurance company, we are enabled to insure any tube against breakage during shipment, at an additional charge of 5 per cent. of the value of the tube. If the insured tube should break during transportation, we must be notified within twenty-four hours of the receipt of the broken goods, and the tube must be returned to us at once, all charges prepaid. We will then forward a new tube immediately in exchange for the broken tube.

We make this offer in good faith and with the sole object of accommodating our customers, and hope that they will avail themselves of this opportunity.

Our Various Anodes

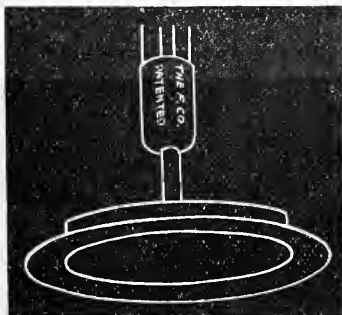


Anode used in our tubes for static machines and light coil work. A rim completely encircles the same.



Anode used in our tubes for heavy coil work, made from welded nickel steel with a facing of heavy platinum.

Three-sixteenths (3-16) of an inch over all.



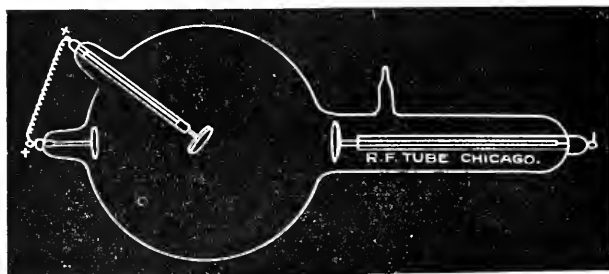
U. S. Patent, No. 726044. D. R. G. M., No. 178799.

Anode constructed the same as above with a flange around the same.

This gathers all the cathode stream, permitting no rays to pass, which causes a sharp, clear, distinct hemisphere back of the same. It is especially designed for fluoroscopic work.

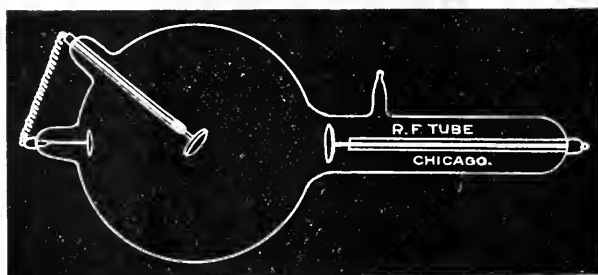
The R. F. Standard X Ray Tubes

Light Anode with Rim



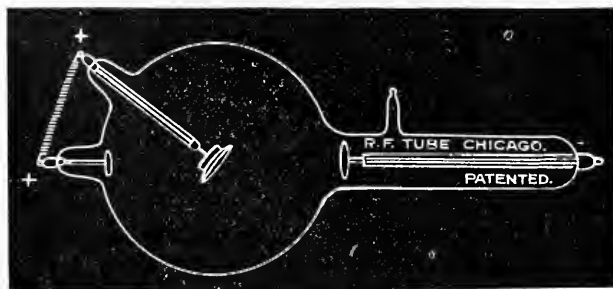
No. 0.	Diameter of bulb, 3 inches	\$6.00
No. 1.	Diameter of bulb, 4 inches	7.50
No. 2.	Diameter of bulb, 5 inches	9.00
No. 3A.	Diameter of bulb, 6 inches	11.00

Heavy Anode for Coil



No. 3.	Diameter of bulb, 6 inches	\$12.50
No. 4.	Diameter of bulb, 7 inches	15.00
No. 5.	Diameter of bulb, 8 inches	17.00

Heavy Anode with Flange



No. 43.	Diameter of bulb, 6 inches	\$13.50
No. 44.	Diameter of bulb, 7 inches	16.50
No. 45.	Diameter of bulb, 8 inches	18.50

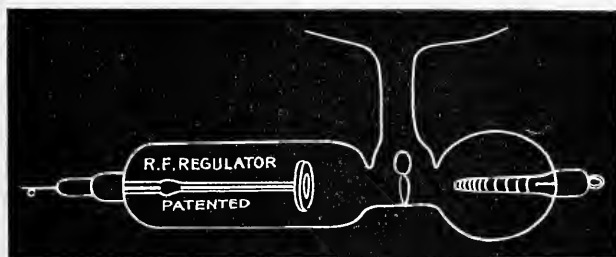
The R. F. Patent Universal Regulating Tube



THE R. F. Patent X Ray Tube, on which we hold United States patent No. 725331, the German patent, No. 145788, the Canadian patent, No. 83281, with the English patent applied for, is the best and most successful tube that has ever been offered to the X Ray specialist.

Like all tubes of our manufacture, its construction is of the highest type of glassblowing, being made from thin, clear, flexible Thuringian glass without flaw or blister. Its perfect focus, the ease with which the vacuum can be raised or lowered at will without heat, renders it adaptable for X Ray therapy, where any degree of penetration is desired, as well as for fluoroscopic or skiagraphic work.

It is made with both the light and heavy anode, the latter with the flange and aluminum jacket. To use it once, is to use it constantly, and if you are not familiar with it let us place your order for one at once.



Manner of Regulation

The regulating device consists of a spiral of platinum and a carbon or mica disc. The spiral of platinum is used in raising the vacuum and the disc for lowering the same. In the above illustration, the part containing the spiral is marked A, the part with the disc, C, a glass partition separating them.

To lower the vacuum attach the CATHODE or negative conducting cord of the main tube to the auxiliary cathode, marked C. If a coil is used, turn on the current carefully and within a second, turn it off again. If a static is used, separate the sliding rods and close them again within a few seconds. A gas will be liberated from the disc, which lowers the vacuum immediately. If the vacuum is not as low as desired, repeat the operation but do not allow the current to act too long upon the disc as it gives off the gas so quickly you may carry it too far.

To raise the vacuum, connect the ANODE or positive conducting cord of the main tube to the auxiliary anode, A, and allow the current to pass through the tube from three to ten minutes, or until the desired vacuum is

obtained. The current causes a vibration of the spiral, thereby drawing the molecules of matter from the large tube into the smaller, where they lodge upon the walls of the same, thus raising the vacuum in the bulb of the larger tube.

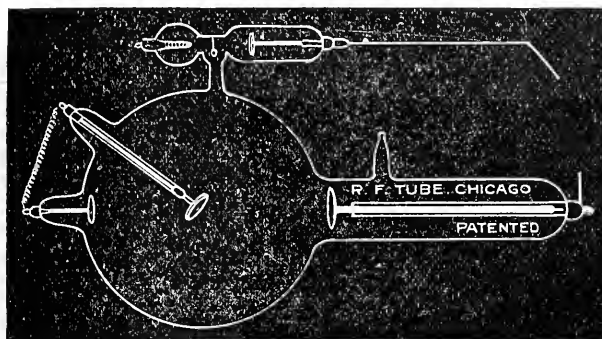
Immediately after raising or lowering the vacuum, make the regular connection to the terminals of the X Ray tube, remembering that unless this is done you do not get the direct current into the tube and, therefore, not the proper X Ray.

Do not place the wire swivel in close contact with the cathode stem of the tube and leave it there as this also will lower the vacuum of the tube. Keep this wire away a few inches and it will act as a safeguard, for when the vacuum begins to raise above the length of the spark gap for which it has been set, the current will jump between these terminals, act upon the disc and prevent the raising of the same.



The R. F. Universal Regulating Tube

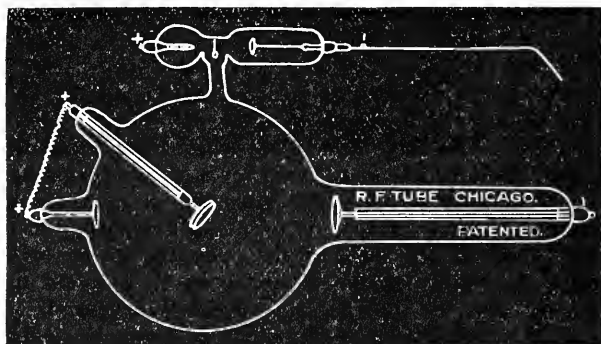
Built Under the Following Patents:



U. S. Patent,
No. 725331.
U. S. Patent,
No. 726044.
German Patent,
No. 145788.
D. R. G. M.,
No. 178799.
Canadian Patent,
No. 83281.
English Patent
Pending.

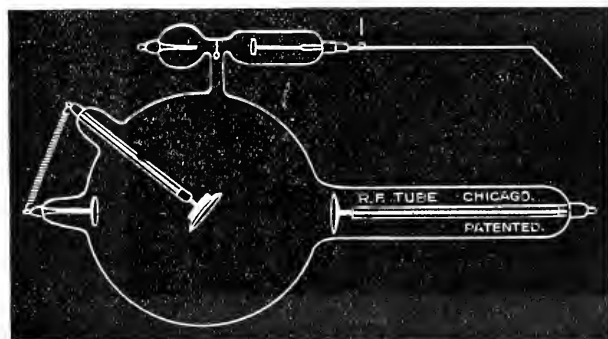
Light Anode Tube for Static Work

No. 6.	Diameter of bulb, 5 inches	.....\$15.00
No. 7A.	Diameter of bulb, 6 inches	..... 18.00



Heavy Anode Tube for Coil Work

No. 7.	Diameter of bulb, 6 inches	.....\$20.00
No. 8.	Diameter of bulb, 7 inches	..... 24.00
No. 9.	Diameter of bulb, 8 inches	..... 28.00



Heavy Anode Tube, With Flange for Fluoroscopic Work

No. 97.	Diameter of bulb, 6 inches	.....\$22.00
No. 98.	Diameter of bulb, 7 inches	..... 26.00
No. 99.	Diameter of bulb, 8 inches	..... 30.00

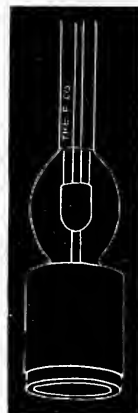
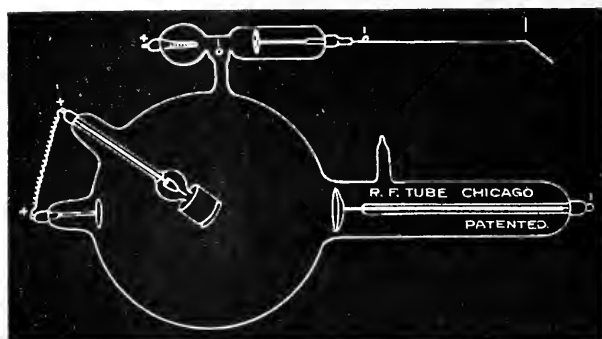
The R. F. Universal Regulating Tube

U. S. Patent, No. 725331.

Canadian Patent, No. 83281.

German Patent, No. 145788.

English Patent Pending.



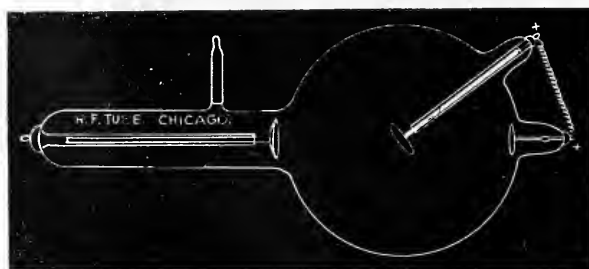
This tube, built with a three-sixteenth (3-16) inch welded nickel steel heavy platinum faced anode, has in conjunction an aluminum jacket round and back from the anode one and one-eighth ($1\frac{1}{8}$) inches.

This jacket acts as a dissipator of the heat, drawing it away from the anode, thereby keeping it cool for a longer period of time.

It is especially recommended for skiagraphic work in connection with coils, having a 12-inch or over spark length. It is so constructed that it will stand heavy work either upon the direct or alternating current, and with the latter, can be depended upon to retain its vacuum during an exposure after the tube has been properly hardened.

The construction of the anode is shown in small cut above.

No. 10.	Diameter of bulb, 6 inches	\$22.00
No. 10A.	Diameter of bulb, 7 inches	26.00
No. 11.	Diameter of bulb, 8 inches	30.00



The above cut illustrates a cheap grade of non-regulating tube for which we have occasional inquiries.

No. 107.	Diameter, 5 inches	\$6.00
No. 109.	Diameter, 6 inches	8.00

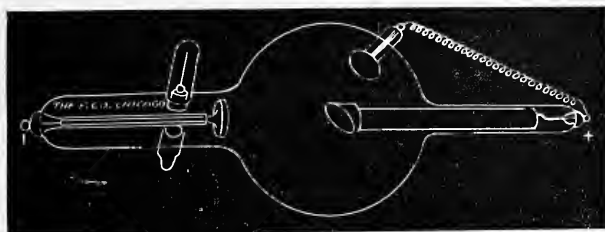
Gundelach Dessauer Tubes



WE also import and carry in stock the celebrated Gundelach tubes with light or heavy anodes as desired. These are all fitted with the heat reducing or Osmo regulator at the prices quoted.

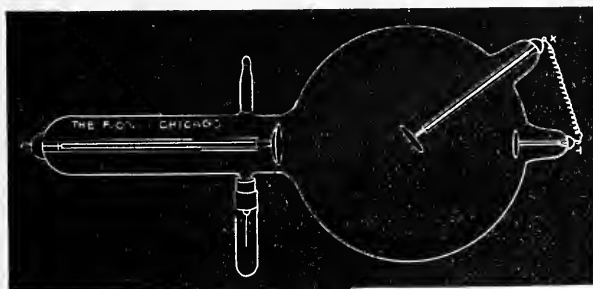
The regulator consists of a hollow palladium tube, closed on the outside, which is sealed into the cathode stem of the X Ray tube. It is protected by a glass covering. When it is desired to lower the vacuum of the X Ray tube, the glass covering is removed and the flame from an alcohol lamp is applied to the palladium tube, until it becomes red hot. The flame is then removed and the palladium allowed to cool, when it will be found that the vacuum of the X Ray tube is perceptibly lower. This has been accomplished by the heat having caused the pores of the palladium to expand and a small quantity of air is received into the tube and transmitted into the bulb of the X Ray tube. The operation can be conducted indefinitely.

Gundelach Heavy Anode Tube



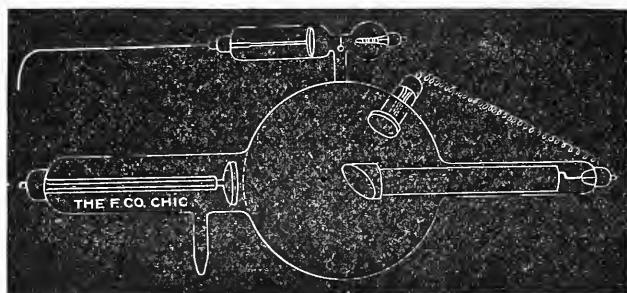
No.	Diameter of bulb.	Spark length.	Price.
A-type	4 1/2 inches	15 to 25	\$15.50
B-type	4 3/4 inches	25 to 40	17.00
C-type	5 1/2 inches	40 to 50	19.00
D-type	6 inches	50 to 60	21.25
E-type	6 1/4 inches	60 to 70	23.75
F-type	6 1/2 inches	70 to 80	25.50
G-type	7 3/4 inches	80 to 100	32.00

Gundelach Light Anode Tube



No.	Diameter of bulb.	Spark length.	Price.
1.	4	8 to 15	\$ 8.50
2.	4 1/4	15 to 20	9.75
3.	5	20	10.50
4.	5 1/2	40	12.75
5.	6	50	13.50

Heavy Anode Tube with Universal Regulator



The above cut illustrates the heavy anode Gundelach tube, connected with our universal regulating device.

Heavy metal anode tubes as a rule have the tendency to drop in vacuum very rapidly when too much current passes through the tube and consequently these tubes after short use become useless for radiographic work, but with our regulating device connected to it, the vacuum can easily be raised or lowered as may be desired.

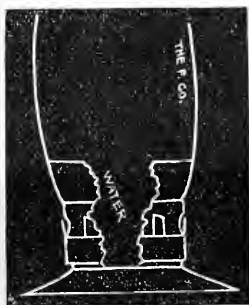
No. 71.	Diameter of bulb, 4 inches	\$16.00
No. 72.	Diameter of bulb, 5 inches	19.00
No. 73.	Diameter of bulb, 6 inches	22.00
No. 74.	Diameter of bulb, 7 inches	28.00
No. 75.	Diameter of bulb, 8 inches	35.00

The R. F. Type of Water Cooling Tubes

U. S. Patent, No. 725044.
 German Patent, No. 127974.
 D. R. G. M., No. 177799.
 U. S. Patent, No. 725331.

U. S. Patent, No. 726044.
 German Patent, No. 145788.
 D. R. G. M., No. 178799.
 Canadian Patent, No. 83281.

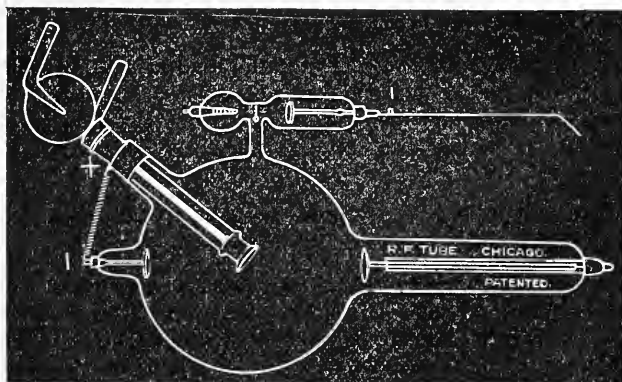
English Patent Pending.



We desire to call especial attention to the anode of our Water Cooled tubes, a cut of which is here shown. The anode is of pure platinum, heavy enough to withstand the discharge of the largest coils used upon the direct or alternating current with any form of interrupter.

The anode is so constructed that the water comes in direct contact with the whole area exposed to bombardment from the cathode stream.

This tube can be furnished with either the universal or the new Friedlander uni-polar regulator.



No. 33.	Diameter of bulb, 6 inches	\$36.00
No. 34.	Diameter of bulb, 7 inches	40.00
No. 35.	Diameter of bulb, 8 inches	48.00

We allow \$6.00 for the return of the anode of our water cooled tubes if received in good condition.

Mr. R. Friedlander's Uni-Polar Regulator For X Ray Tubes

New U. S. Patent, No. 777503.

U. S. Patent, No. 725044.

German Patent, No. 127974.

D. R. G. M., No. 177799.

U. S. Patent, No. 725331

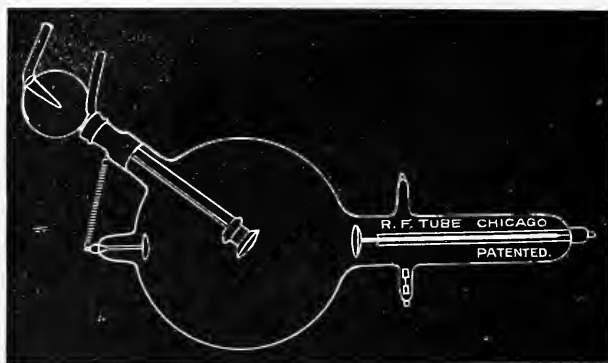
U. S. Patent, No. 726044.

German Patent, No. 145788.

D. R. G. M., No. 178799.

Canadian Patent, No. 83281.

English Patent Pending.



The above tube is the latest invention of Mr. R. Friedlander, and on which he has been allowed a very broad patent.

This tube overcomes the necessity of the auxiliary bulbs upon the globe of an X Ray tube, which has been an objection on account of the fragile nature of X Ray tubes and also the chance from puncture, resulting from too close proximity to the conducting cords from apparatus to the X Ray tube.

The uni-polar regulator, as its name implies, is a regulator by which the vacuum of an X Ray tube can be raised or lowered.

The device consists of a gas absorbing and a gas evolving element which is affixed to the cathode stem of the tube and is entirely removed from the field or range of the X Ray. It is enclosed with a covering of glass with an external connection for attachment to the source of electrical energy. An opening is also made into the cathode stem. To reduce the vacuum of an X Ray tube, connect the anode of the X Ray tube to the positive conducting cord from apparatus and the negative conducting cord from apparatus to the tip of the regulator. Turn on the current for a moment and off quickly, being careful not to hold this connection too long and thus lower the vacuum more than is desired. To raise the vacuum of an X Ray tube make the same connections as for lowering, *but* through the pole changing switch on the

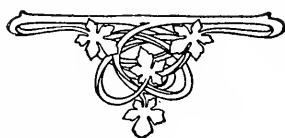
coil in the opposite direction, thereby making the anode the cathode terminal, and the "element" the positive terminal. Run the coil from one to two minutes, depending, of course, on how low the vacuum was and to where it is desirous of raising it.

It will thus be seen that the regular cathode terminal of the X Ray tube is entirely thrown out of circuit, as experiments have shown that the cathode terminal is in itself a gas evolving agent, and hinders the process of quickly manipulating the vacuum of X Ray tubes.

This uni-polar regulating tube was shown at the meeting of the American Roentgen Ray Society held in Baltimore in September, 1905, and created marked attention.

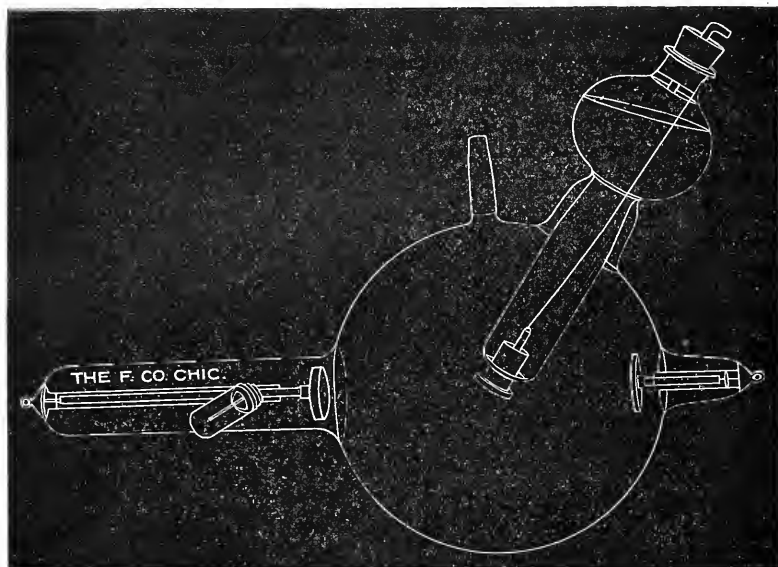
Any tube of our manufacture can be equipped with this uni-polar regulator at the same price as tubes which are now supplied with our universal regulator.

No. 23.	Diameter of bulb, 6 inches, 50 cm.	\$31.00
No. 24.	Diameter of bulb, 7 inches, 70 cm.	35.00
No. 25.	Diameter of bulb, 8 inches, 80 cm.	40.00



A German Type of Water Cooling Tube

with Osmo Regulator for Reducing



As in our own type of tube, the anode is so constructed that the water comes in direct contact with the whole area exposed to bombardment from the cathode stream, with this addition, that part of the inner surface of the anode is forced up, allowing a solid metallic contact to the anode, the metal in addition to the water-cooling, acting as an anticipator to the heat, so that boiling of the water is positively omitted and it is absolutely impossible for the anti-cathode or anode to become red hot. If requested, we can furnish this tube with our latest universal uni-polar regulating device.

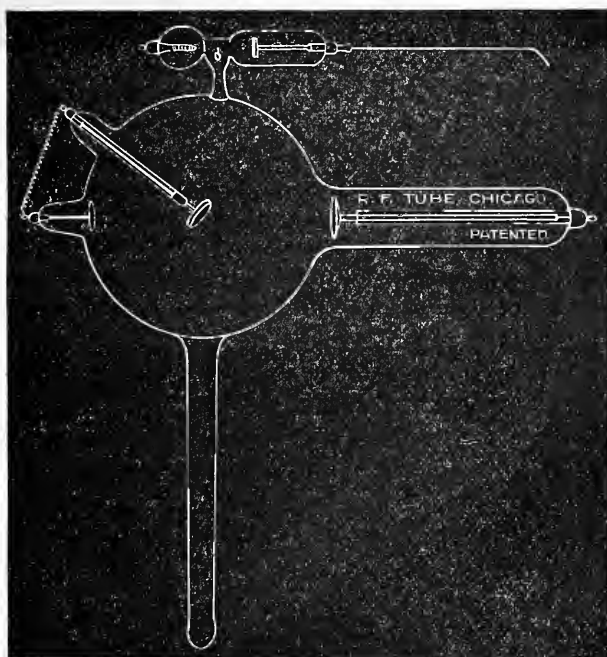
No. 39.	6 inches diameter of glass bulb, with Osmo regulator.....	\$30.00
No. 39A.	6 inches diameter of glass bulb, uni-polar regulator.....	37.00
No. 40.	7 inches diameter of glass bulb, with Osmo regulator.....	40.00
No. 40A.	7 inches diameter of glass bulb, uni-polar regulator.....	45.00
No. 41.	8 inches diameter of glass bulb, with Osmo regulator.....	48.00
No. 41A.	8 inches diameter of glass bulb, uni-polar regulator.....	53.00
No. 42.	10 inches diameter of glass bulb, with Osmo regulator.....	55.00
No. 42A.	10 inches diameter of glass bulb, uni-polar regulator.....	62.00

In using this particular tube, attention is especially called to the fact that the tube must never be brought in a position while in action, by which the platinum anode is left without water. It is necessary to pay strict attention to this point and to always see that the water-cooling compartment is kept filled with water, as otherwise the tube will crack at the anode end without fail.

X Ray Tubes for Treatments Within the Cavities

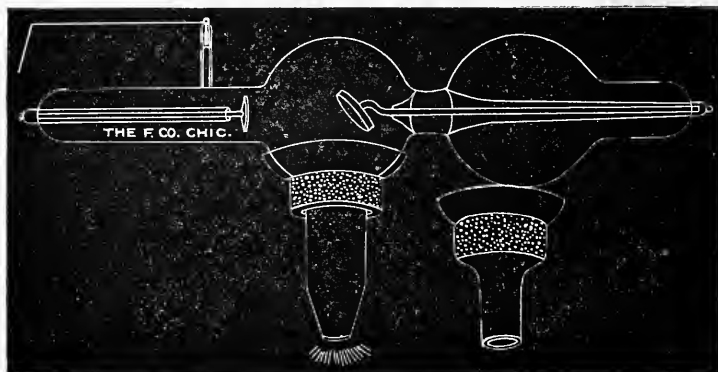


WE illustrate three types of X Ray tubes for the application of X Rays within the cavities. The first is the Friedlander, by which X Rays are transmitted along the extension and given out at the end in straight lines, making an ideal tube for cervix or where the rays are to be applied over a small area. With this tube it is genuine X Rays and not cathode rays that are given off, and therefore there is no heat and a water jacket is not required. It is fitted with the Friedlander universal regulator.



No. 117.	Price, with light anode	\$22.00
No. 118.	Price, with heavy anode.....	25.00

Dr. Piffard's Safety X Ray Tube



This tube is constructed of two bulbs of lead glass, each bulb being four inches in diameter and connected together so that the vacuum is equal in each. A window of crown glass is arranged in front of the anode so that the X Ray generated can be transmitted to the part undergoing treatment.

The tube is provided with our new patent regulator, which insures perfect control of the vacuum and two lead glass extensions are furnished to reduce the active area of the ray.

The mechanical finish in regard to electrodes, tips, etc., is the same as used in all our tubes and therefore need no description.

As lead glass cuts off most of the rays, this makes an ideal tube for therapeutic work, but is recommended by Dr. Piffard, only for superficial and not deep lesions or radiographs.

(For further information, we refer to Dr. Piffard's original article and description in the *New York Medical Journal*, July 15, 1905.)

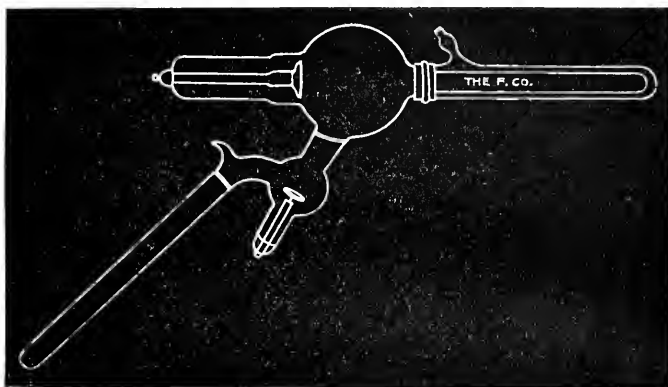
The tube can be used either with static machine or coil and we recommend it to the profession as a safeguard to patient and operator.

No. 48. Price, for use with static\$15.00

No. 49. Price, for use with coil 18.00

The Caldwell Treatment Tube

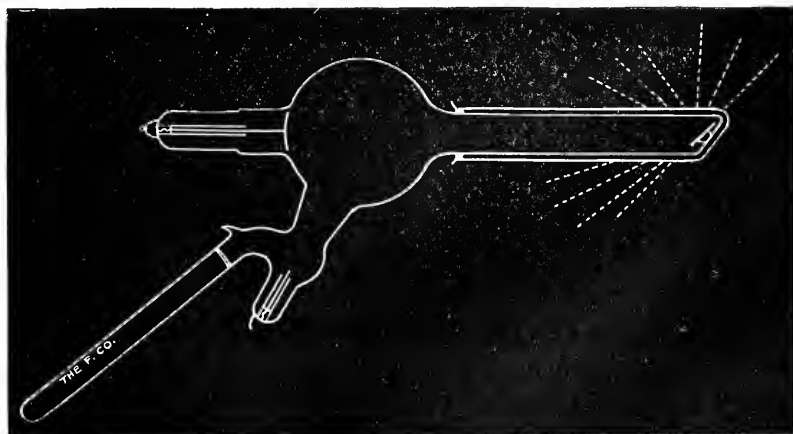
The Caldwell tube is designed for treating the walls of the cavities. The cathode stream is thrown against the walls of the extension from which X Rays are said to emanate. As the cathode stream is heat-producing the extension is covered with a jacket which is filled with water.



No. 50. Price\$10.00

The Morton Treatment Tube

The Morton type of tube is that designed by Dr. W. J. Morton of New York, and is similar to the Dr. Caldwell tube, except that a platinum target is interposed at the end thereby throwing the rays backward and outward with greater force. With this tube there are no X Rays at the end of the extension. Connection to the various sources of energy for producing X Ray is made the same as with any X Ray tube. The Caldwell and Morton type have long extension handles for holding and manipulating the tube. On account of the close contact to the part undergoing treatment, very short exposure is made.

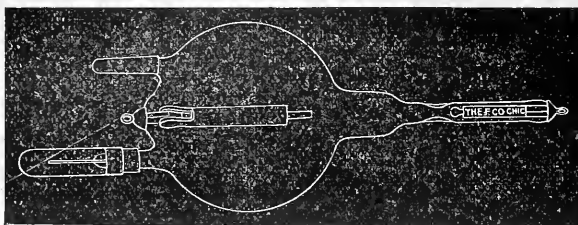


No. 51. Price\$12.00

The Latest Type of Ventril or Valve Tube



THE Ventril or Valve tube is a tube which is used in series between the coil and X Ray tube, for the purpose of cutting out the alternations or phosphorescent rings which are manifested at various times within the bulb of an X Ray tube. These peculiar rings which are noticed in the X Ray tube are caused by the "make" being greater than the "break" in magnetizing and de-magnetizing the primary of the coil, which



necessitates the current output from the secondary of the coil being unsteady and consequently irregularities in the ray within the tube.

This fault is usually due to the interrupter not being exactly suited or else improperly adjusted with the coil.

The ventril tube is so constructed that the current can pass through in one direction only, viz., from A to B.

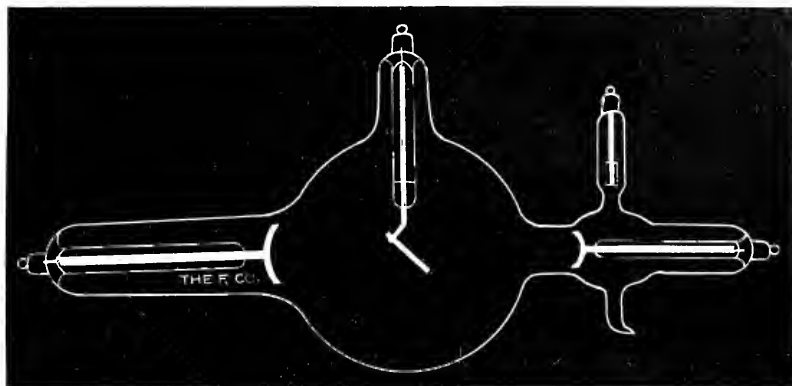
When electrolytic interrupters are used drawing heavy amperage, a ventril tube should always be used, as aside from its advantage of giving a more uniform and steady X Ray within the tube proper, it saves greatly the wear and tear on the X Ray tube. To use this tube, connect the long stem of the ventril with the cathode stem of the X Ray tube with a suitable wire. Connect the tip on the top of the bulb (A) with the apparatus and the regular anode of the X Ray tube, also with the apparatus. It makes no difference how near or how far the ventril tube is from the X Ray tube, but have the long stems of each connected. If improperly connected the ventril tube will raise rapidly in vacuum and soon become so heated that the glass terminals within the tube will snap off and render the tube valueless.

The ventril tube is provided with an Osmo regulator for reducing the vacuum, which should be kept low to give the best results.

Apparatus equipped with the ventril tubes in series gives better skiagraphs and render fluoroscopic examinations with a coil outfit very satisfactory.

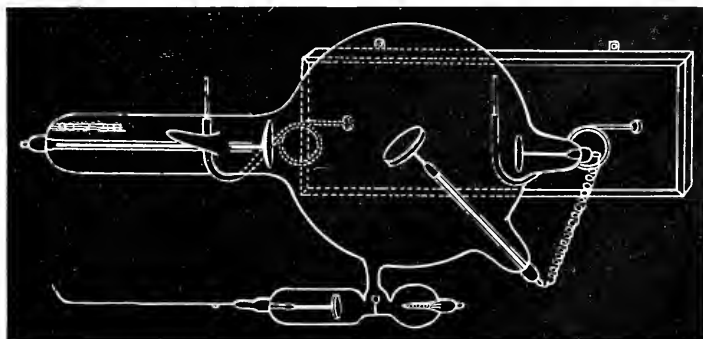
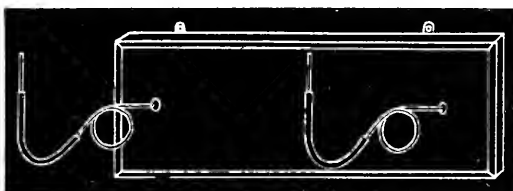
Special X Ray Tube

For Use on the Tesla Form of Coils.



- No. 46. Price, with bulb $5\frac{1}{4}$ inches in diameter..... \$14.00
 No. 47. Price, with bulb 6 inches in diameter..... 16.00

The R. F. Safety Tube Hanger



When the X Ray tube is not in use it is well to hang it up on the wall in a safe place, where it is out of the reach of danger and cannot be broken.

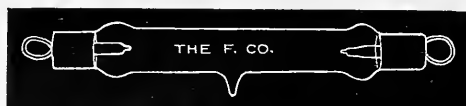
For that purpose we have devised our tube-hanger, and a glance at the cut shows how admirably it answers the purpose.

Send for one and preserve your tube. No. 72. Price, \$1.00.

Series Gaps



R. R. Friedlander has demonstrated that the small vent tube, as here shown, if suspended between the anode and anti-cathode terminals of an X Ray tube, possesses qualities similar to those of the ventril tube, as it acts as an equalizer of the current between the metal terminals, as above mentioned, within the tube.



This device readily corrects the irregularities which appear after a tube has been used some time with a static machine.

No. 53. Price, \$1.50.

Dr. W. F. Becker's Spark Gap



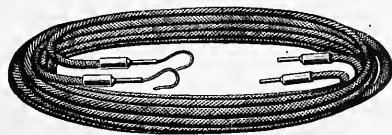
The above spark gap was suggested by Dr. Becker, of Chicago, to be used upon the cathode terminal of an X Ray tube where no multiple spark gaps are used upon the coil or static. This adjustable gap is to be used in series with the X Ray tube and the gaps from the apparatus, and gives unusual brilliancy and penetration to the X Ray.

To connect, simply hook the device into the loop on the tip of the cathode stem of the X Ray tube, and from the other hook on device connect direct to source of energy with which tube is to be used. Adjust the length of gap desired by means of set screw and small sliding rod.

Connect the anode terminal of X Ray tube as usual.

No. 54. Price, \$2.00.

Insulated Conducting Cords



Our insulated conducting cords are carefully made and can be safely used with any form of electrical apparatus.

Each cord is five feet in length and fitted with suitable hooks and tips and convenient for any form of binding post.

No. 55. Price, per pair, \$1.50.

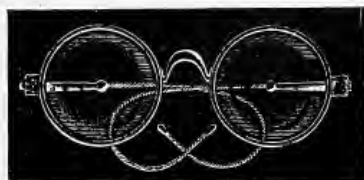
Imported Lead Glass Plates

For the protection of the practitioner, which cannot be penetrated by the X Ray.

No. 56.	7x9½ inches	\$1.60
No. 57.	12x14 inches	4.00

Protective Spectacles

These spectacles are furnished with large, round, plain-cut, lead glasses, measuring 45 to 48 mm. in diameter, and will not allow the X Ray to penetrate them. Nickel frame.



No. 58.	Price, including case	\$2.50
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X Ray Lead Foil

No. 388.	Per pound	\$0.25
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The Barnum High Frequency X Ray Tube



In nineteen hundred and four, O. Shepard Barnum, M. D., Los Angeles, Cal., conceived the idea that if an X Ray tube could be made that would energize from the Oudin resonator, valuable results might be had, by combining both X Ray and high frequency currents, if applied simultaneously.

We therefore devised the above tube, which meets all requirements and by actual tests, have proven results as anticipated.

The tube is but little larger than a regular high frequency electrode and contains both a cathode and anode disc. The cathode terminal only is connected with a conducting cord to the resonator and as the cathode stream bombards the anode, an abundance of X Ray is produced sufficient for local treatment, radiographs and fluoroscopic examinations. When contact is made to the patient, a high frequency discharge accompanies the ray, which feature is now considered by operators of great value. The high frequency current producing an X Ray without heat, permits of a close contact which greatly reduces time of exposure. Specialists can have this tube made with extensions for rectal, vaginal, nose and throat work, a tube for raying each condition being necessary.

The tube is made of lead glass, the window being of flint glass, so that no shield or mask is required. A long insulated handle gives the operator complete control of the tube without danger of sparking. The tube is provided with our patent regulator, so that the vacuum is under perfect control of the operator. It has the usual bi-polar connections, so that it can be used on the coil or static like any X Ray tube if desired.

No. 59. Price, \$12.50.

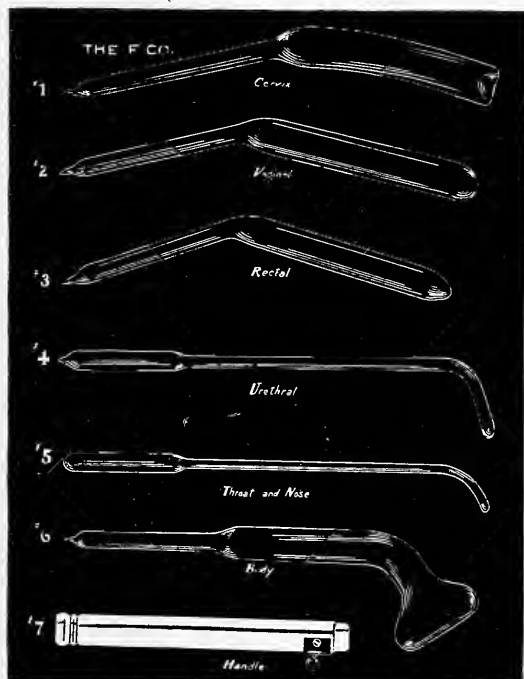
High Frequency Electrodes

We desire to notify physicians that our High Frequency Electrodes are made with unusual care, and in exact conformity to specific measurements furnished by Dr. Mae Cushman Rice, Chicago, that every electrode will fit absolutely the anatomical part for which it is intended.

The glass used in their construction is of a special blowing, hard, smooth, without blister or flaw. The vacuum of each electrode is exactly timed that it may be perfect, which is so essential where good high frequency work is expected.

Special electrodes for various purposes, which are not listed, will be made to the order of the physician, who may rest assured that his design and measurements will be carefully carried out in every detail.

Orders for these goods are especially solicited.



Dr. Rice's Improved H. F. Electrodes

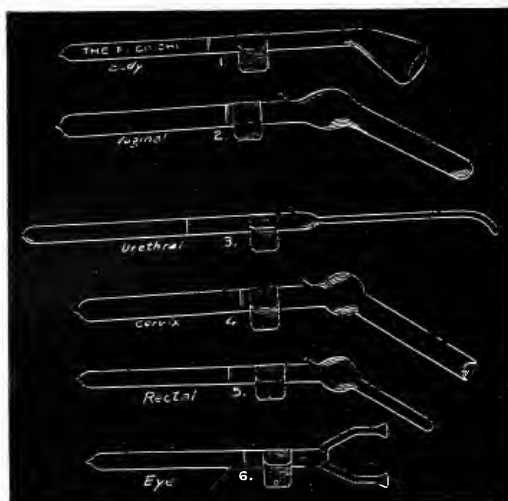
- No. 1. General surface electrode.
- No. 2. Vaginal.
- No. 3. Cervix.
- No. 4. Rectum.
- No. 5. Throat and Nose.
- No. 6. Urethral.

No. 60. Price, complete with handle\$5.00
 Single electrodes, each... .75
 Handle, extra75

High Frequency Electrodes

Glass Insulated Handle Electrodes

Similar to the Dr. Rice design.



- No. 61. Price for complete set of six \$8.50
 Single electrodes 1.50

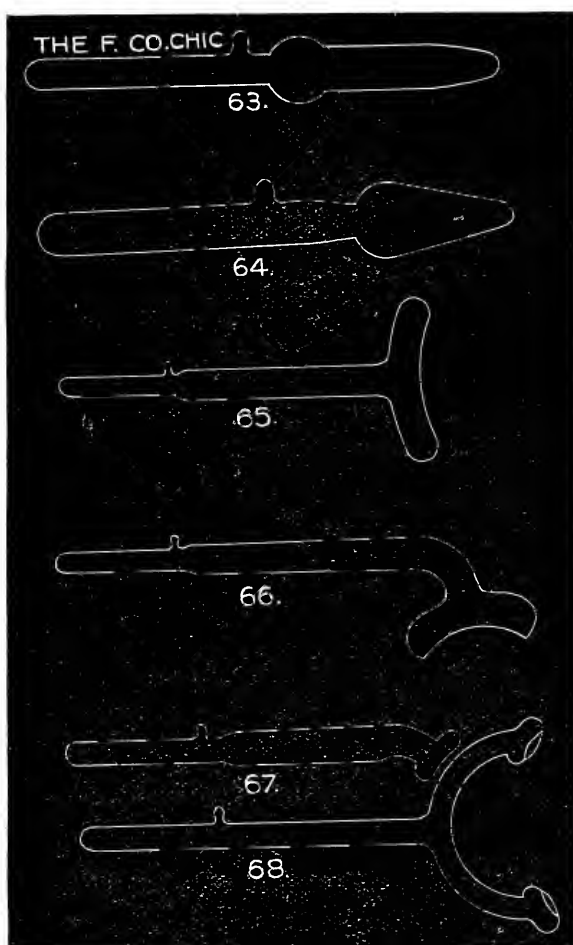
Dr. Grubbe's Body Electrode



This electrode was especially designed by Dr. Grubbe for general surface use, where it was desired to apply high frequency in the strongest manner possible. It is made with a metallic terminal within, which is brought very closely to the glass, and the current following down this metallic circuit is thrown with great force against the lower wall of the electrode and is given off with greatly increased energy, than where it passes through the whole vacuum of the electrode without this disc terminal.

- No. 62. Price, \$3.50.

High Frequency Electrodes

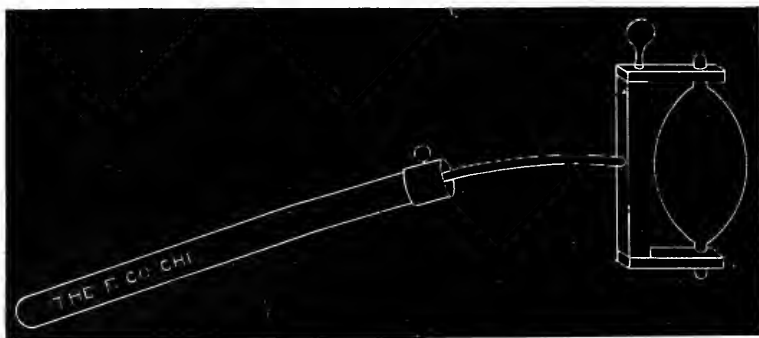


- | | | |
|---------|---|--------|
| No. 63. | Dr. W. H. Dieffenbach special electrodes for constipation.
Three in a set, including handle, $\frac{5}{8}$, $\frac{7}{8}$, $1\frac{1}{8}$ inch diameter. | \$3.50 |
| No. 64. | Ear Electrode, to fit any handle, each | 1.00 |
| No. 65. | Throat Electrode, to fit any handle, each | 1.00 |
| No. 66. | Mastoid Electrodes, two in a set (right and left), per set.. | 2.00 |
| No. 67. | Single Eye Electrode, made for any handle (give diameter wanted) | .75 |
| No. 68. | Double Eye Electrode, made for any handle (give diameter wanted) | 1.00 |

These electrodes can be manufactured with glass handle and outside metal sleeve contact at an additional cost of 50 cents per piece.

Attention is called to the fact that we are pleased to manufacture any special electrode that may be desired.

Dr. Piffard's Vacuum Rolling Rheophore



Dr. Piffard has designed this electrode especially for high tension and high frequency currents so that it may be used directly from a static machine or from a resonator or transformer, as desired.

It will be found exceptionally convenient where the current is to be applied over an extensive surface.

No. 363. Handle and 2 Vacuum Bulbs\$3.50

Cataphoresis Electrode

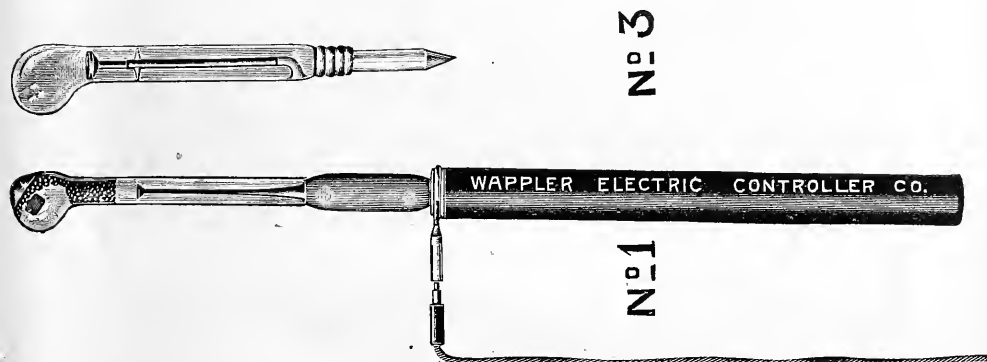


This electrode, like the Grubbe electrode, is used on high frequency currents and has a cup-shaped compartment in front, which will allow medicated oils to be placed in the same, by saturating an asbestos plate with the oils.

No. 364. Price\$4.00

Uni-polar X Ray Tube

Useful in X Ray treatments of the Larynx, Oesophagus, Mouth and other cavities.



When the high-frequency currents generated in the solenoid (spiral wire) enter the tube at the extremity of the cathode, part of it is changed into cathode rays, which are discharged as such from the surface of the cathode, impinging on the anode (or on the wall of the tube if no anode is present), at which point they are changed into X Rays. A considerable portion of the current travels unchanged on the surface of the tube, from where it is given off in the form of high frequency sparks. The strength of these sparks can be increased or diminished at will, depending upon the distance the tube is held from the surface treated. When the tube is held in contact with the parts treated, we get the maximum amount of X Rays with the minimum amount of sparks, the high frequency currents passing to the surface as such without producing any sensation due to the dynamic effect of the sparks. In the smaller tubes, in which the cathode is very near the wall of the tube, it is advisable to have the glass stem through which it passes, insulated, to avoid the sparking from the cathode to the surface of the tube.

No. 69. Price, \$5.00.

Geissler Tubes.



No. 17.



No. 18.



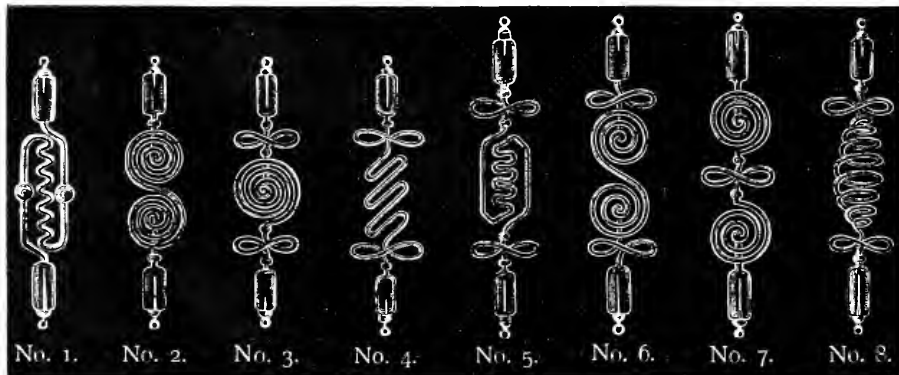
No. 19.



No. 20.



No. 21.

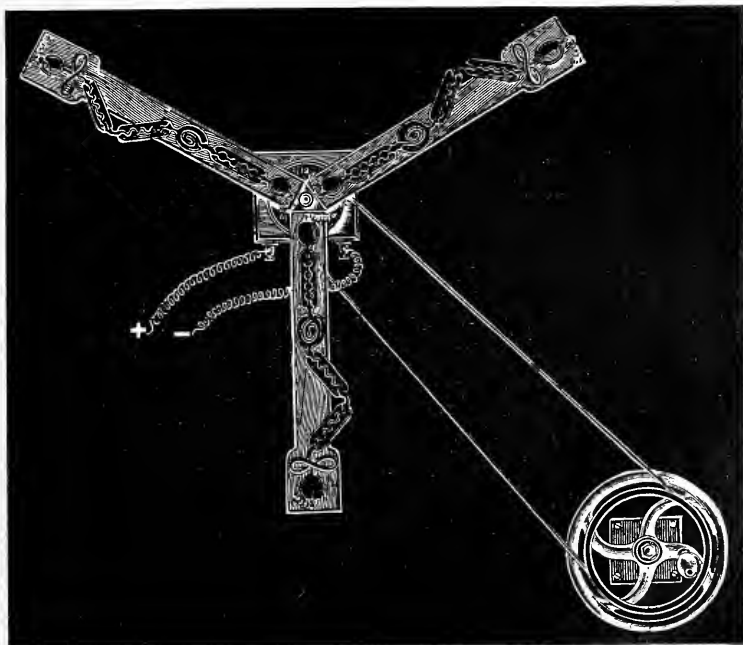


No. 1. No. 2. No. 3. No. 4. No. 5. No. 6. No. 7. No. 8.

We have constantly in stock Geissler tubes of various lengths and sizes, and are prepared to make anything that may be required in this line.

No. 71.	Price, Nos. 1, 2, 3 or 4, 6 inches long	\$0.75
No. 71.	Price, Nos. 5, 6, 7 or 8, 8 inches long	1.25
No. 71.	Price, No. 17, with 2 fluorescent liquids, 12 inches long....	2.00
No. 71.	Price, No. 18, with 3 fluorescent liquids, 18 inches long....	5.00
No. 71.	Price, No. 19, with 1 fluorescent liquid, 15 inches long....	2.50
No. 71.	Price, No. 20, with 1 fluorescent liquid, 18 inches long....	4.00
No. 71.	Price, No. 21, with 2 fluorescent liquids, 24 inches long....	7.50

Rotation Apparatus



Rotation Apparatus with three elaborately finished Geissler Tubes, 24 inches long, containing two or three fluorescent liquids.

No. 70. Price, complete \$50.00

The effect that is accomplished with the above illustrated apparatus is very attractive, as the tubes fluoresce in every color of the rainbow and, by rotating, cause an optical illusion.

Barium Platinum Cyanide Screens and Fluoroscopes



The one accessory to an X Ray equipment which, as a rule, received the least attention from a physician and which should have the best care, is the fluoroscope, as the delicate nature of the barium platinum cyanide crystals render it readily susceptible to the action of light, heat and dust, from which it should be carefully protected.

It is with great confidence that we announce, after repeated experiments, that we are now able to manufacture barium platinum cyanide screens of the highest type of perfection. The screen is of a beautiful apple-green color, giving a fluorescence which is clear, lasting and of great brilliancy, and which is the least affected by climatic changes of any screen, either of American or foreign manufacture, that it has been our pleasure to examine during the years that we have been handling goods of this character.

It is a well-known fact that imported screens absorb moisture to a certain extent during shipment, which in time dims the lustre, thereby greatly shortening the life of the same. The screen, coming in large sheets which have to be cut to fit the various sizes as required, cause a crushing of the crystals from which deterioration sets in and rapidly affects the whole screen, turning it to a yellowish brown color, and when a screen reaches this stage, its usefulness is gone.

In the manufacture of barium platinum cyanide screens, we use every precaution against crushing the crystals, using special machinery for the manipulation and spreading of the same, which is done under the most aseptic conditions. Each screen is made separately and of the right size, being affixed to the frame of the fluoroscope by a process that in no way causes friction or the least possible chance for any injury to result from outside conditions whatsoever. The fluoroscope is made with a detachable bottom, which allows the screen to be used for diagnosis in a darkened room, thereby permitting several persons to view the examination at once. With proper care the fluoroscope should last the physician for years.

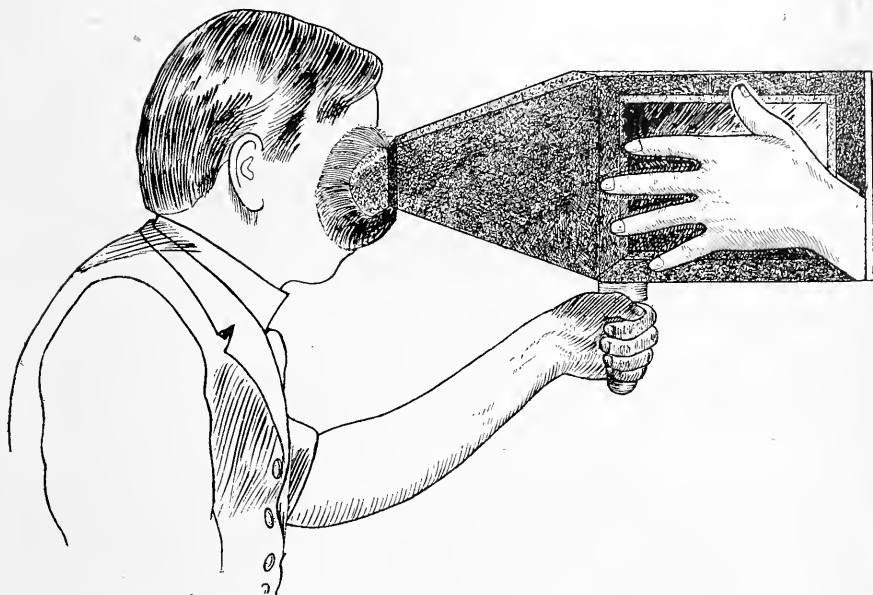
No. 82.	Fluoroscope complete, with	4x 5 screen	.....	\$ 6.00
No. 82.	Fluoroscope complete, with	5x 7 screen	.....	8.50
No. 82.	Fluoroscope complete, with	6x 8 screen	.....	12.00
No. 82.	Fluoroscope complete, with	7x 9 screen	.....	16.00
No. 82.	Fluoroscope complete, with	8x10 screen	.....	20.00
No. 82.	Fluoroscope complete, with	10x12 screen	.....	30.00
No. 82.	Fluoroscope complete, with	11x14 screen	.....	38.50

Price of screens ready to be attached to frame of fluoroscope:

No. 83.	4x 5 screen	.....	\$ 4.00
No. 83.	5x 7 screen	.....	6.00
No. 83.	6x 8 screen	.....	9.00
No. 83.	7x 9 screen	.....	12.50
No. 83.	8x10 screen	.....	16.00
No. 83.	10x12 screen	.....	24.00
No. 83.	11x14 screen	.....	30.75

Prices on larger sizes quoted upon request.

The Johnston Fluoroscope



A new idea in fluoroscopes has been presented by George C. Johnston, M. D., Pittsburg, Pa., which we are certain will greatly interest physicians, especially those who are obliged to use the fluoroscope constantly in their practice. The fluoroscope is designed so that the screen is parallel with the line of vision and reflected by a mirror which is set at an angle of 45 degrees. The box being so constructed that the proper distance has been accurately calculated and no distorted or double image is shown.

In using the fluoroscope the observer stands at the side of the tube, which should be covered by our patent protective shield, allowing ample X Ray for examination. He is then entirely outside of the field of the ray and absolutely safe.

The patient is placed between the opening of the shield and screen of fluoroscope as in making any examination, and is therefore exposed as has always been the case.

The fluoroscope is fitted with our 5x7 barium platinum cyanide screen, which is most satisfactory for general work, although fluoroscopes of larger size can be furnished to order.

No. 84. Price\$15.00

The R. F. Protective Shield

U. S. Patent No. 731,767



HIS shield absolutely protects both operator and patient from the danger of burns caused by exposure to the X Ray. It is made over a papier-mache form, which is immersed and afterwards coated with a composition which is opaque to the X Ray, and then covered and finished in a neat and artistic manner. There is no sheet lead or metal used in the construction of the shield, which eliminates all danger of puncture, and as the shield is amply large it allows an air space between tube and shield, thus insuring the operation of a cool tube, which is necessary in order to retain a uniform vacuum. This is an essential point and must be considered.

The shield covers all the active surface of the globe and none but the desired rays are emitted; various diaphragms accompany the shield, so that an area ranging from 1/2 to 4 inches in diameter can be rayed. By means of the hard rubber specula with which the shield is provided, treatment can be given within the cavities.

The shield takes the place of tinfoil masks and all other forms of protection, rendering treatments absolutely safe, a point which we believe will be greatly appreciated by the physician.

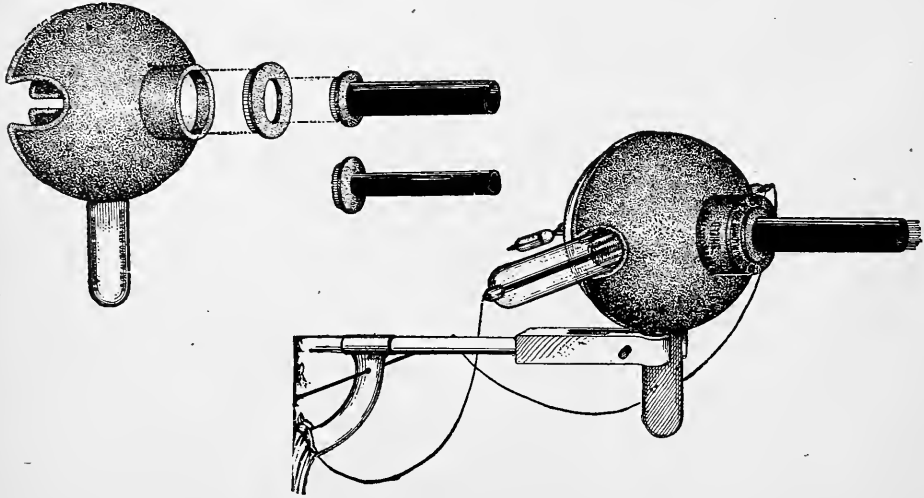
The shield gives ideal results in radiography, as it cuts out all diffused and secondary rays, the direct ray alone acting upon the plate. The negative comes out clear and distinct, and as the edges of the plate are not over-exposed, a sharp negative results which greatly facilitates diagnosis.

As the opinion differs among physiciaus as to which is the most active ray given off from an X Ray tube, we manufacture shields with openings either at a right angle or of forty-five degrees to the anode.

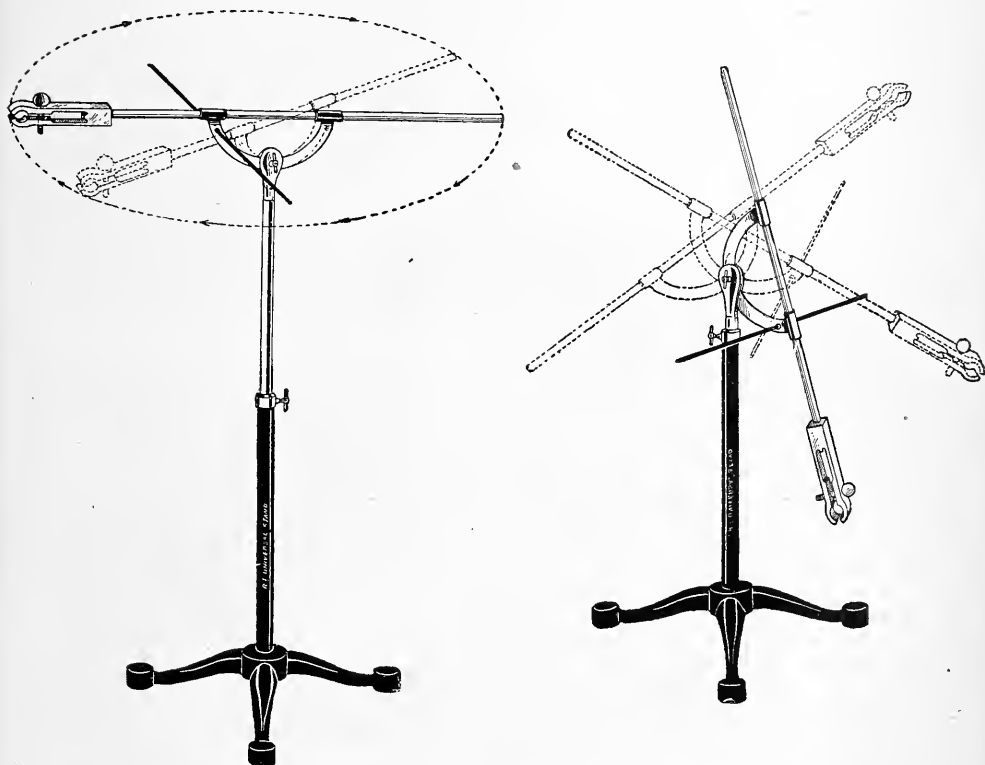
- No. 86. Shield for a tube 6 inches in diameter with a 3-inch opening. . \$10.00
- No. 87. Shield for a tube 6 inches in diameter with a 4-inch opening. . 12.00
- No. 88. Shield for a tube 8 inches in diameter with a 4 inch opening. . 14.00
- No. 89. Shield for a tube 6 inches in diameter with a 3-inch opening,
for rays at right angles to the anode 10.00

All shields fitted with the various diaphragms and hard rubber extensions.

The Nos. 2 and 3 shields are also fitted with a new and improved adjustable handle, which allows the shield to be turned so that the patient can be treated in the incumbent position.



The R. F. Improved Tube Stand



We desire to call particular attention to our tube stand, believing that we have a stand which overcomes the disadvantages of many upon the market.

The base is a tripod, extending long enough to overcome the weight of the largest tube when the arm is fully extended. The arm for holding the tube can be adjusted so that the tube can be held in a horizontal, perpendicular, or at any angle and at any height desired; thumbscrews hold the same tightly. A spreader for keeping the conducting cords always at a safe distance is provided, and this distance never varies no matter in which position the tube is placed.

The arm and clamp revolve in a circle, which allows the tube to be placed over or turned away from the part to be radiographed or patient undergoing treatment, thereby overcoming any possible chance of breaking the tube by attempting to place the patient after the tube has been adjusted to the proper height.

The stand is neatly finished, the base being black enamel, all other parts nicely nickel-plated.

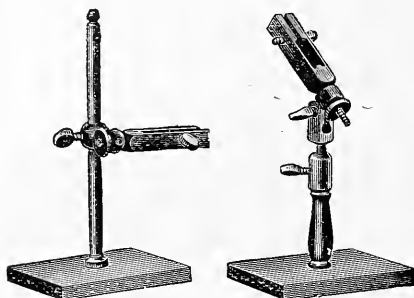
No. 91. Price, \$12.50.



No. 92. Tube holder rod with curved clamp\$1.00



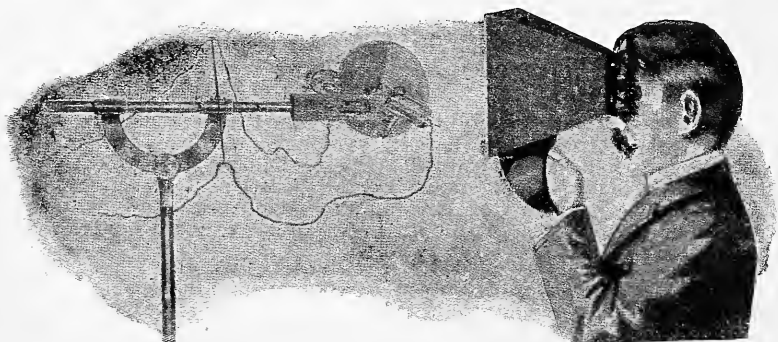
No. 93. Tube holder rod with curved clamp\$2.00



No. 94. Tube stand, made of wood for table, with straight clamp....\$2.00

No. 95. Same stand with curved clamp 2.25

The Friedlander Fluoroscope Shield



For protecting the hand that is exposed while using the fluoroscope.

Made of the same material as our X Ray shield, and can be fitted to any fluoroscope by attaching to the box by two small screws.

No. 85. Price, \$3.00.

Induction Coils



It is with perfect confidence that we recommend the "Western" X Ray and the Scheidel coils to our patrons. We use these coils daily in our manufacturing department, where they are in use from morning till night, undergoing the hardest kind of work. During the time that we have had them under observation we have never had a breakdown nor a coil burn out. We have always found them reliable, simple to operate and most efficient for all classes of work.

The manufacturers of these coils, besides their personal guarantee, issue to the purchaser a ONE THOUSAND DOLLAR (\$1,000.00) Gold Bond Security, which insures the coil against breakdown or burning out for a period of FIVE (5) Years from date of purchase, and should either of the above accidents happen during that period the damaged coil will be replaced with a new one.

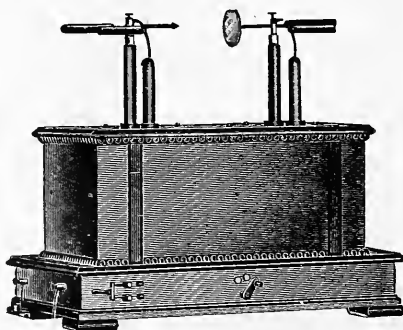
These coils have the distinction of being used by the most noted radiographers in America, all of whom speak in the highest terms of their merits.

The construction of this apparatus consists of a core of double-annealed Norway iron wire, which is imported direct. The wire on the primary is arranged to consume the least amount of current possible to secure the maximum energy from the secondary.

The construction of the primary is such that these coils will operate at one-third the expense of other coils on the market. The secondary sections are built on exclusive lines and treated by a process which insures the greatest degree of insulation possible, after which the entire coil is submerged in a semi-fluid insulation.

The coils are mounted in a very handsome manner, the case of which may be finished in either cherry or mahogany. The table is strong and durable and finished in harmony with the coil. All wiring for the necessary connections to interrupter, rheostat and line are concealed, and the complete apparatus when installed presents a handsome and impressive piece of office furniture.

The Western X Ray Induction Coils



Received Highest Award at the Louisiana Purchase Exposition.

On the front lower left section of the coil will be noticed the pole-changing switch. The operator by this means is enabled to place his tube in the holder as will best suit the requirements, for the direction of the current can be instantly changed by simply throwing the switch.

Price of Induction Coils

No. 121.	12-inch Induction Coil, for alternating current only	\$150.00
No. 122.	12-inch Induction Coil, for use with either direct or alternating current	175.00
No. 123.	14-inch Induction Coil, for use with either direct or alternating current	225.00
No. 124.	16-inch Induction Coil, for use with either direct or alternating current	275.00
No. 125.	18-inch Induction Coil, for use with either direct or alternating current	325.00
No. 126.	20-inch Induction Coil, for use with either direct or alternating current	375.00
No. 127.	22-inch Induction Coil, for use with either direct or alternating current	425.00
No. 128.	24-inch Induction Coil, for use with either direct or alternating current	475.00

Prices on coils of over 24-inch spark length furnished on application.

Western X Ray Coil

Installation for Direct Current



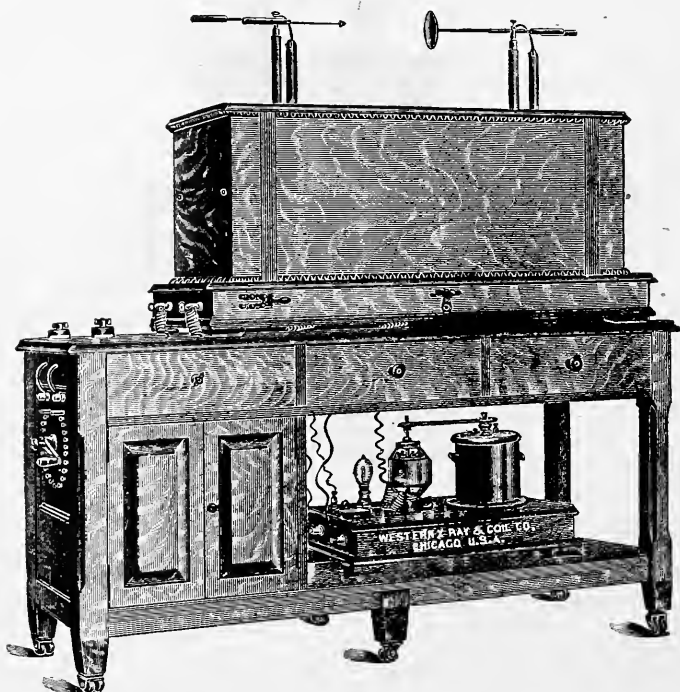
Prices quoted are for complete outfit, consisting of Coil, Mercury Turbine Interrupter, Rheostat and Table, completely wired.

No. 129.	Outfit with 12-inch coil, 110-volt direct current	.....\$300.00
No. 130.	Outfit with 16-inch coil, 110-volt direct current	..... 350.00
No. 131.	Outfit with 20-inch coil, 110-volt direct current	..... 460.00
No. 132.	Outfit with 24-inch coil, 110-volt direct current	..... 560.00

Add \$15.00 to prices quoted if apparatus is to be used on 220-volt direct current.

Western X Ray Coil

Installation for Direct Current



This apparatus is designed for hospitals, sanitariums and institutions where it is desired to use both the mercury turbine and electrolytic interrupter. The table is massive and imposing, has extra draws and an enclosed compartment in which the electrolytic interrupter is placed. Prices quoted are for complete apparatus, consisting of Coil, Mercury Turbine and Electrolytic Interrupter, Rheostat and Table properly wired. A double switch on the table enables the operator to use either interrupter at will.

No. 133. Outfit with 20-inch coil	\$535.00
No. 134. Outfit with 22-inch coil	585.00
No. 135. Outfit with 24-inch coil	635.00

If the outfit is to be used on the 220-volt direct current, add \$15.00 to prices quoted.

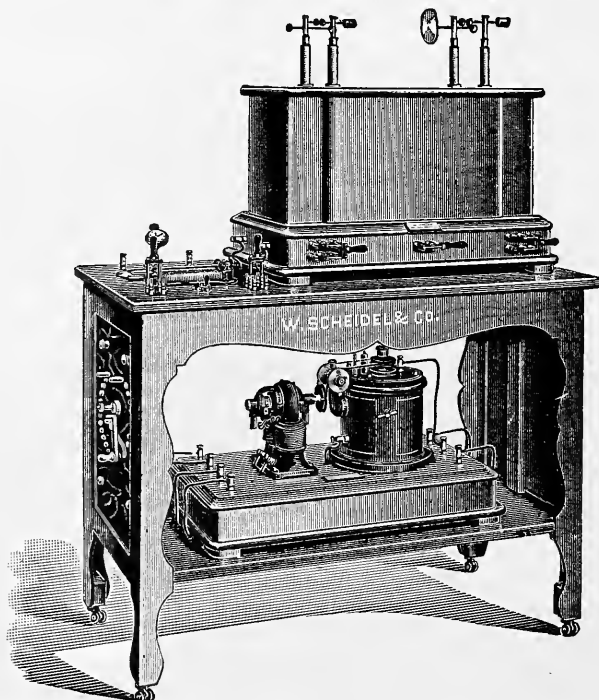
How to Set Up and Operate the Western Coil on the Direct Current



If a Table Outfit for the Direct Current has been purchased, the table is completely wired for all connections before it leaves the factory, and all that is required is to place the coil upon the table and assemble its parts. In mounting the outfit, observe cuts in catalog. Screw the spark gap posts into the coil first, then the posts for the coil terminals. Tighten all carefully, but do not use force enough to strip the threads in the hard rubber collars. See that the metal plate is on the right hand side as you face the coil, as this is the **NEGATIVE** terminal; the other terminal being the **POSITIVE**. Place the mercury turbine interrupter on the shelf under the table and connect the protruding wires at hand to both coil and interrupter. Connect the wires from the incoming main to the two binding posts on the back of the table. Prepare the mercury interrupter for use as directed under "Directions for Preparing this Interrupter for Use." See that the lever in the middle of the base of coil is pushed far to the right, so that it rests on the last button as you face the coil. See that the pole-changing knife switch in the lower left hand base of the coil is closed. This can be thrown in either direction, but preferably so that the current will flow from the positive to the negative terminal. Close the large knife switch on the incoming main. (This should always be provided, as it is a decided safeguard.) In front of the table will be noticed a keyhole; insert the key which comes with the outfit and see that this contact is closed. This is a precautionary arrangement, thereby permitting one to open this switch, remove the key, and irrespective of the manner in which the switches on apparatus are thrown, no current can pass through the coil. On the top of the table will be observed two switches, one marked Motor, the other Main. Turn on the one marked Motor first, which allows the motor on interrupter to start, which causes the mercury to make and break contact against the copper segments within the pot. Next turn on the switch marked Coil, which allows the current to pass into the interrupter and thence to the primary and secondary of the coil. Gradually cut out the rheostat till the proper amount of current flows through the coil. In cutting off the current from the coil, turn off switch marked Coil first, and then the switch marked Motor. When suspending operations with the coil it is always best to open pole-changing switch on the base of the coil, as well as the large knife switch to the line. Return rheostat to point marked Weak, as it is always best to cut the same out gradually when operating the coil, as it is a safeguard against allowing too much current to pass rapidly into an X Ray tube or high frequency apparatus.

Scheidel's Induction Coil Table Equipment with Mercury Turbine Interrupter

For Direct Current Circuits



The accompanying illustration shows one of the most popular combinations of standard apparatus. It consists of a twelve-inch Induction Coil with variable inductance.

The interrupter usually supplied with this style of apparatus is a standard Mercury Turbine Interrupter driven by a one-tenth horsepower direct current motor, but the apparatus may be equipped with an additional electrolytic interrupter at any time without rebuilding the induction coil, as the inductance of the primary is quickly varied to suit the different kinds of interrupters.

On the left end of the table is the controlling rheostat, built into the table in the most permanent and compact manner.

The main switch controlling the current supply for the whole equipment serves also as pole changer, and is placed on top of the table, together with the switch and speed regulating rheostat for the interrupter motor. Conforming with the wishes of individual purchasers, measuring instruments, timing devices and incandescent lamp bracket, with shade for scale illumination, are added. We show in this catalogue, instruments adapted for equipment of this class from which the purchaser may select.

This outfit is entirely self contained, can be readily connected through binding posts in the rear of the table to circuits of normal carrying capacity, as found commonly in buildings.

The table itself is mounted on castors of liberal proportions and, therefore, readily movable. The whole apparatus is simplicity and compactness itself.

A full set of instructions, illustrated properly by connection diagrams and drawings, accompanies each apparatus, enabling anybody to install and operate the instrument without previous knowledge in this line of work.

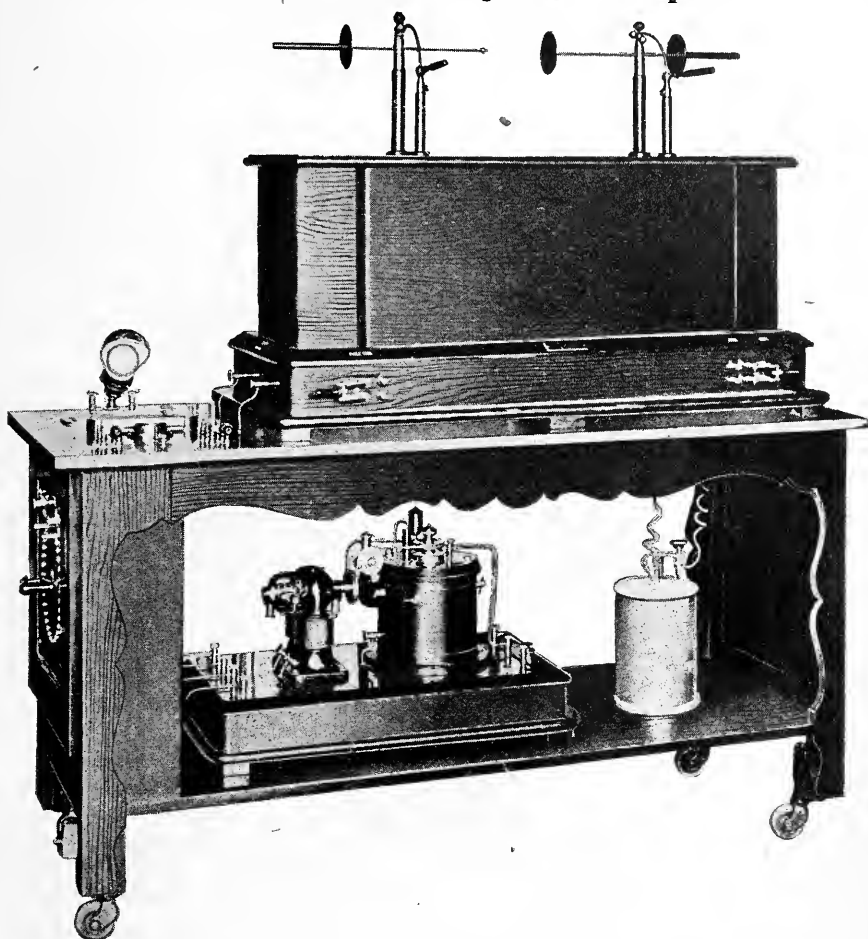
Each apparatus is subjected to a series of most severe tests, of which complete records are kept.

Standard 12-inch Direct Current Coil Equipment, with Full Variable Inductance

No. 74. One 12-inch D. C. Coil	\$175.00
One Mercury Turbine Interrupter	75.00
One Table Cabinet with Rheostats and Switches	50.00

\$300.00

Scheidel's Coil Table Equipment for Use with Mercury Turbine and Electrolytic Interrupter



The professional X Ray operator, or the physician with a practice of similar requirements, desire for quick and effective work induction coils of larger output than those of twelve-inch spark length.

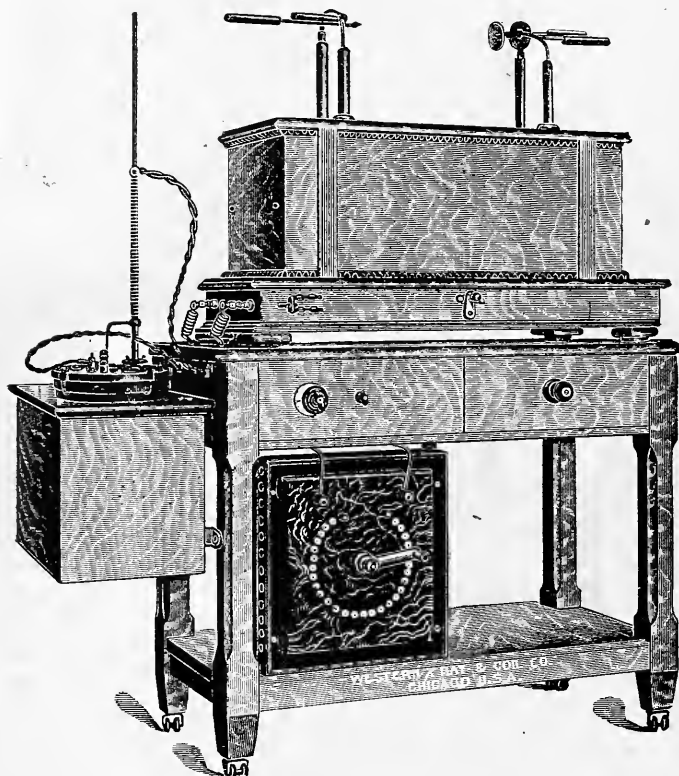
This class of instrument is usually supplied with mercury turbine and electrolytic interrupters, as the induction coil is designed with a view of using either one, according to working conditons or the wishes of the operator. The ordinary arrangement of instruments, switches and controlling rheostats is seen on the left end of the table, every part being substantial and well in proportion with the general appearance of the apparatus. The table is mounted on large castors and can be easily moved from one place to another. The instructions accompanying each instrument are clear and concise, and the method of illustrating them by means of blue-prints has met with general approval, as even those who were totally inexperienced in mechanical or electrical matters have never encountered any difficulty in this respect.

Standard 18-inch Coil Hospital Equipment with Combined Interrupters for Direct Current

No. 75. One 18-inch Coil with variable inductance	\$325.00
One Mercury Turbine Interrupter	75.00
One Electrolytic Interrupter. See Figs. 14-15, page 19	25.00
One Table Cabinet mounted on heavy rubber-tired rollers, including Rheostats, Switches, Binding Posts, Wiring, etc.	55.00
(Most complete and powerful.)	\$480.00
One Table Cabinet as above, but including Volt and Ampere Meter, Split Second Timing Stop Watch, Light Bracket with half shell Porcelain Shade, etc.	\$150.00

Western X Ray Coil

Installation for Use with Either Alternating or Direct Current



Prices quoted are for complete outfit, consisting of **Coil**, Electrolytic Interrupter, Rheostat and Table completely wired.

No. 76. Outfit with 12-inch Coil, for alternating current only\$225.00

No. 77. Outfit with 12-inch Coil, alternating or direct current 250.00

No. 78. Outfit with 16-inch Coil, alternating or direct current 350.00

No. 79. Outfit with 20-inch Coil, alternating or direct current 460.00

No. 80. Outfit with 24-inch Coil, alternating or direct current 560.00

How to Set Up and Operate the Western Coil on Alternating Currents



If a Table Outfit is purchased for the alternating current, the table is completely wired for all connections before it leaves the factory, and the outfit should be assembled the same as directed when the coil is to be used upon the direct current. We recommend that the instructions there given be read carefully, as many suggestions there given will materially aid in the manipulation of coils upon the alternating current.

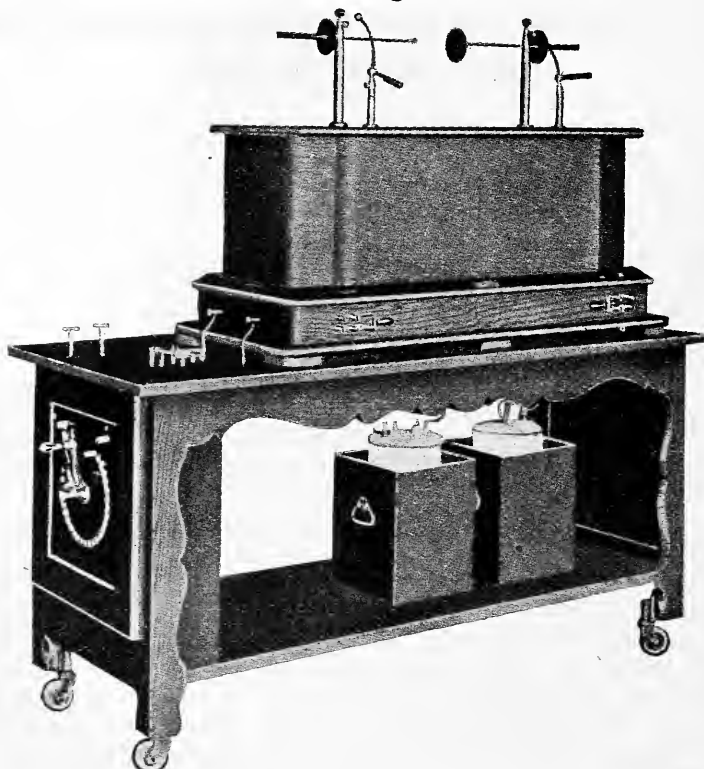
In mounting your outfit observe the cut in the catalog.

If the coil is to be used upon an alternating current of 104 to 110 volt, with cycles from 125 to 140, see that the lever in the middle of the base of the coil is placed far to the left, so that it rests on the **FIRST** button as you face the coil. If the coil is to be used upon an alternating current of 110 volt, with 60 cycles, see that this lever is placed upon the **SECOND** or **MIDDLE** button as you face the coil.

Prepare the solution for the interrupter as directed on page where electrolytic interrupters are minutely described. Read all instructions there given carefully. Be sure and select the formula for the proper solution in accordance with the current on which the coil is to be used. This is very essential. After filling the interrupter to the required height with the solution, carefully screw down the cover and pass the long German silver rod through the coiled wire spring, through the porcelain tube, allowing the same to rest upon the porcelain disc below. Arrange the tension of the spring and fasten the same securely. Connect one of the flexible insulated wires protruding from the left-hand side of the table to the point of contact on set-screw that holds the spiral spring to the feed wire, and the other flexible wire to the binding post on the cover of the interrupter. Look well to the closing of the necessary switches.

We recommend that occasionally you examine the porcelain tube and disc within the interrupter, as after a time the porcelain disc will have a small hole worn into it, caused by the feed wire gradually working against it, and when this happens the disc should be turned around, so that a new surface is presented. If these instructions are faithfully carried out success is sure to be achieved in handling this apparatus.

Scheidel's Single Switch Table Equipment with 12-inch Coil, Water-Jacketed Electrolytic Interrupter and Valve For Alternating Current



The type of apparatus shown here is a standard alternating current outfit operating on alternating current circuits of all commercial frequencies and voltages.

It consists of a table containing controlling switch and rheostat, the lower shelf of which is utilized for the electrolytic interrupter and valve. We have a large number of these instruments in operation all over this country, all of which have given satisfaction to the operator. The prevailing tendency in electric central station practice, favoring the alternating current distribution systems, is daily increasing the heavy demand for this type of equipment. The design, material and workmanship are of the best throughout.

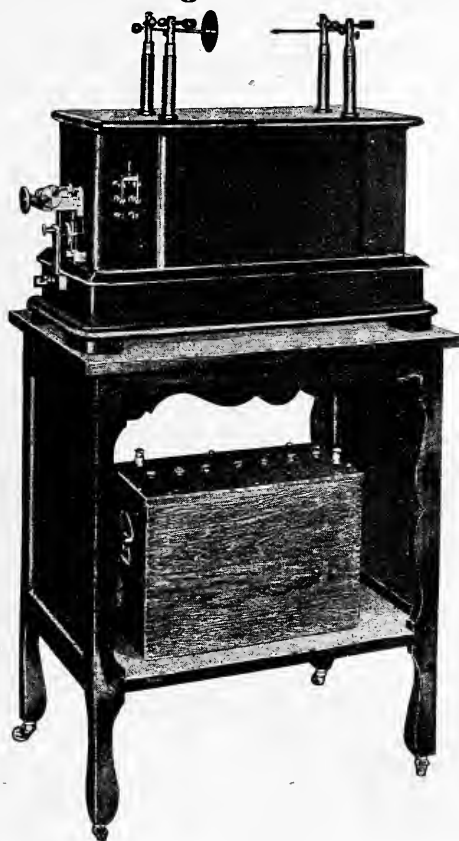
When ordering, please state exact conditions under which the apparatus is to be used in most cases. The object of this request is our desire to supply apparatus only after thorough and severe tests under actual working conditions, which is necessary for successful operation of induction coils on alternating current circuits.

As it is our wish to facilitate the installation and successful operation of apparatus, instructions and connection diagrams are furnished sufficient to enable anyone to perform this work without previous knowledge.

Standard 12-inch Coil, Alternating Current Equipment

No. 81. One 12-inch Coil	\$175.00
(Without variable inductance, \$150.00.)	
One Table Cabinet with Rheostat and Switch	45.00
One Electrolytic Interrupter, with essential parts of porcelain, incased in water cooling jacket	25.00
One Rectifying Valve in porcelain jar, incased in water cooling jacket	25.00
	\$270.00

Scheidel's Portable Induction Coil for Use with Storage Batteries



The general design of this instrument is the same as those larger types adapted for mercury turbine interrupter. Battery coils, however, are generally built with interrupter of the vibrator type, for the purpose of limiting the total weight and space occupied. This type of apparatus is built from six inches upward to twelve inches, and supplied either as table equipment, illustrated here, or coil and storage batteries separate. The source of power is an eight cell storage battery of reliable make, which, under ordinary conditions, will be found fully satisfactory. Batteries of larger capacities will be supplied upon request, exact instructions and diagram of connections accompanying every apparatus.

The vibrator usually supplied with this coil has all the necessary adjustments, is strong and serviceable and provided with very heavy platinum iridium points giving excellent service.

The condenser is built into the base of the apparatus. The very best material only is used in its construction, the adjustment is perfect, the whole arrangement being thoroughly tested before shipment is made. The workmanship and finish is of the highest grade throughout, as with all Scheidel apparatus.

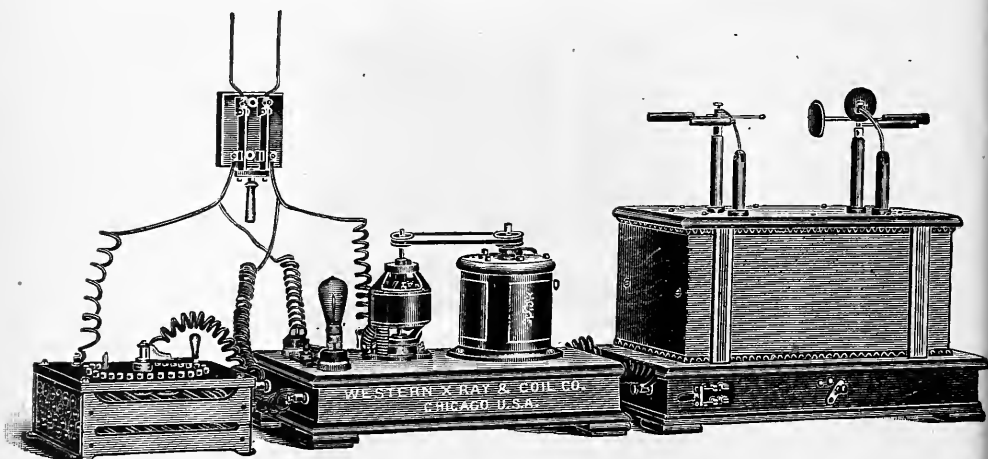
No. 73. 12-inch Coil with Vibrating Interrupter attached\$200.00
One 16-volt Storage Battery in neatly finished case 75.00

\$275.00

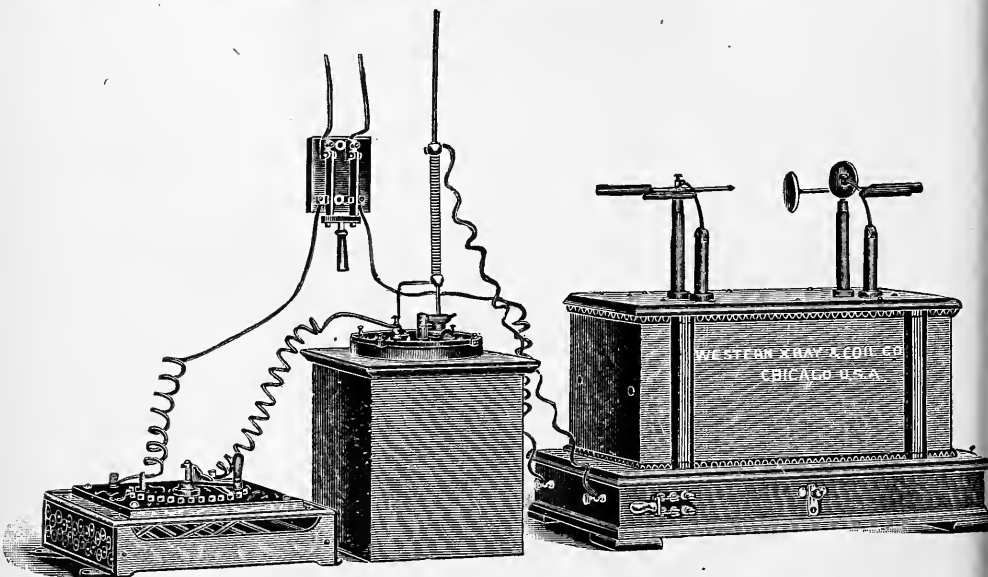
Price of tube stand, tube and fluoroscope as per selection.

When coil outfits are purchased without a table and the necessary wiring has to be done by a local electrician, he will follow suggestions for wiring in accordance with plan here submitted.

Coil Installation for Use on Either the 110 or 220-Volt Direct Currents



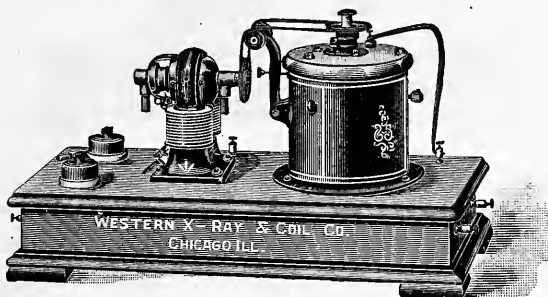
Coil Installation for Either the Direct or Alternating Current



When the coil is used upon the direct current with the electrolytic interrupter, have the switch in the middle of the base of the coil on the second button, as the winding of the primary is adjusted for the best output of current at that point.

“Western” Mercury Turbine Interrupter and Condenser

For Use on 110 or 220 Volt Direct Circuits



There is possibly no part of the Induction Coil which is of greater importance to its successful operation than the Interrupter and Condenser. These attachments should be perfectly tuned to each other and the interrupting device should be of such construction that it insures a thorough saturation of the magnetic core before the break occurs. After the break is made the Condenser should be of sufficient capacity to quickly de-magnetize the core. Again, the period between the break and the make should be sufficiently rapid so that there is a continuous stream of current flowing constantly from the secondary. If this feature is not secured the light in the tube will be unsteady or have a flickering effect, and it is a well-established fact that where this flickering does occur it is practically impossible to make a satisfactory fluoroscopic examination, owing to the changeable fluorescence. The so-called hammer breaks are not of sufficient rapidity to insure a steady current, and, further, being supplied with platinum contacts, they are constantly burning out and cause considerable annoyance to the operator. We have been most painstaking in our experiments, and know that the Interrupter which we present is without doubt the most constant on the market. Also, there is no loss of time to the operator through re-lacing of parts where they become deficient through use.

The device consists of a Motor, a Tubular Jacket and a Pot. The pot is conical in shape, with a cup at the bottom. The cover is arranged with two segments of copper and a central tube. In the upper portion of the tube is a small opening. The material employed for making contact is fluid mercury. The mercury is covered with an oil, which prevents the possibility of the current arcing at the make and break. The mercury at rest is in the bottom of the pot. When the motor circuit is closed it rotates the central tube, which forces the mercury upward, where it is thrown out from the small jet, making contact with the copper segments. The mercury is the conductor by which the current from the line is allowed to pass into the coil.

The Condenser is placed in the box and is constructed on sectional lines, with a switch that enables the operator to place in use 6, 12, 18, 24 or 30 layers. This is important, for it enables the operator to alter his condenser surface if for any reason he desires to change the inductance in the primary. The tinfoil used in the Condenser is of the highest grade and the insulation between layers is mica, which insures perfect insulation.

With this Interrupter the operator may feel assured of satisfactory results on either the 110 or 220-volt circuit and it is applicable to coils of any spark length. Where the 220-volt current is utilized it is necessary to have a motor to stand that voltage and in ordering always specify what the voltage is. This type of Interrupter will consume less current, and it is conceded by all operators that for general work it is the most satisfactory. In skiagraphic work it will not give the rapid results that can be secured from the Electrolytic Interrupter, and we find many operators who make a specialty of radiotherapy and radiography employing both types on one apparatus.

No. 136. Interrupter and Condenser for 110 volts	\$75.00
No. 137. Interrupter and Condenser for 220 volts	80.00

Scheidel Mercury Turbine Interrupter

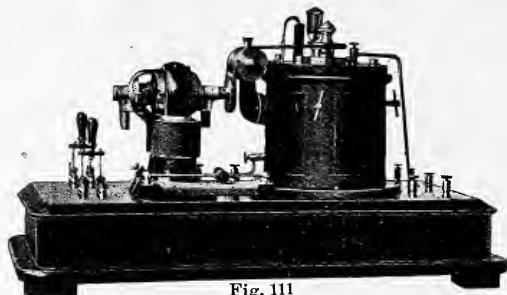


Fig. 111

This Mercury Turbine Interrupter, which has attained a well deserved popularity, performs its work in the following manner:

A quantity of mercury, contained in an iron receptacle is lifted by the centrifugal force of a quickly revolving body and thrown in a continuous revolving stream against the downwardly projecting teeth of an iron ring, secured to the insulating cover of the interrupter. While rotating, the mercury stream strikes alternately the segmental teeth, which form one pole, and the wall of the receptacle, which forms the second, that is the same pole as the mercury itself, thus interrupting the current rapidly at the very instant the mercury stream leaves the teeth. As the speed of the revolving device is rather high, and the whole performance takes place under oil, the interruptions are quite sharp and very closely timed. The number of interruptions being entirely independent from the strength of the current to be interrupted, and easily controlled by the speed-regulating rheostat of the driving motor, the advantages of this arrangement become at once appar-

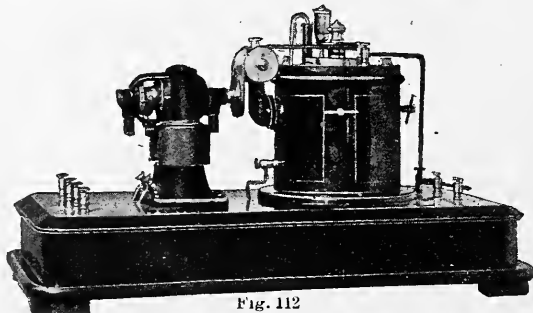


Fig. 112

ent. It is a well recognized fact that this Mercury Turbine Interrupter is far superior to any other mechanical break. The workmanship is the best throughout; all parts are interchangeable. Interrupter and driving motor, and if necessary, speed regulator with switches, are mounted upon a highly mahogany finished sub-base, which contains the condenser, fully adjusted and ready for work if furnished with the Scheidel Coil. If supplied for use with coils of other make, exact data must be furnished or the coils must be sent to our factory for such adjustment.

When ordering Mercury Turbine Interrupter it must be borne in mind that we mount this type apparatus in two different styles. Fig. 111 represents method of mounting if the interrupter is supplied without table equipment. Fig. 112 shows the apparatus without switches and motor speed controlling rheostats. This method of mounting is employed, whenever table equipments are supplied, as these controlling devices are placed on top of table for the sake of convenience.

Type 111.	Mercury Interrupter with switches and speed regulating rheostat	\$80.00
Type 112.	Mercury Interrupter to be used with our standard tables or special cabinets	75.00

Directions for Preparing the Interrupter for Use

Remove the belt from the motor, screws from the cover of the pot, and detach the insulated wire from the binding post on cover, when it can be lifted from the jacket.

Obtain five (5) pounds of REDISTILLED MERCURY. Do not use the so-called purified or mercury of commerce, as it contains so many impurities that in a short time it emulsifies and will stop up the small jet hole through which the mercury contact is made to the copper segments, and which will necessitate a cleaning of the same.

Fill the cup in the bottom of pot full of the redistilled mercury and pour on enough PRATT'S ASTRAL OIL to fill the pot to within one and one-half ($1\frac{1}{2}$) inches from the top. Replace the cover, screws, belt and connect the insulated wire to the binding post on cover and the interrupter is ready for use.

How to Clean the Interrupter

Remove belt, insulated wire and cover as in preparing the Interrupter for use. Back off the three thumb screws, which will be noticed around the middle of the jacket. Lift the pot from the jacket. Pour off the astral oil and with cotton remove the remaining traces of oil from the mercury, which should be strained through chamois.

With waste or cheese cloth wipe out the pot carefully, thereby removing all traces of the emulsified mercury. Return the cleansed mercury to the pot, filling the cup with new mercury till it is again full. Fill the pot to the required height with new oil, but do not attempt to use the oil that has once done service. Wipe off the under side of the cover carefully and remove the central tube, which is threaded and comes off readily. Clean tube carefully and replace. Insert a wire through the small jet hole in the side of piece to which the central tube is attached. Replace cover and screws and the pot within the jacket, tightening the three thumb screws about the same, and make connection with the insulated wire to top cover, and replace the belt.

If redistilled mercury and Pratt's astral oil are used, the Interrupter should run months without attention.

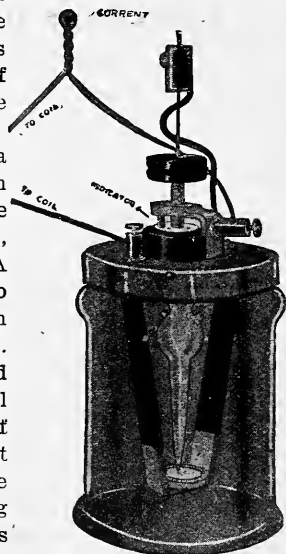
Improved Electrolytic Interrupter

U. S. Patent No. 716584.



THIS interrupter is a decided improvement over the old Wehnelt type, inasmuch as the feed wire is replaced by gravity as fast as it is consumed, and the same amount of wire is constantly exposed to the action of the electrolyte.

The jar is of glass, in which is suspended a U-shaped lead upon which is affixed a porcelain disc. A device for controlling the amount of wire exposed to the electrolyte is placed upon the cover, into which a hollow porcelain tube is placed. A thumbscrew raises or lowers the porcelain tube, so that a greater or less distance is produced between the bottom of the tube and the porcelain disc. The wire is inserted through the thumbscrew and porcelain tube and rests upon the disc. A small brass weight is affixed to the wire at a distance of eight inches above thumbscrew, so that a contact from the binding post on the cover can be made to the weight, to which one of the wires supplying the current is attached; the other supply wire is attached to one binding post which leads to the primary of the coil, and a short piece of wire connects the other post from primary of the coil to the binding post affixed to the lead of the interrupter. If a rheostat is used it should be placed in series, by connecting one supply wire to one terminal of the rheostat, the other terminal of rheostat to the feed wire of interrupter.



When the direct current is used, the positive supply wire should be connected to the feed wire of the interrupter, but when the alternating current is used, either supply wire can be used, as it is not a directional current.

To determine which is the positive or negative wire from the incoming main, immerse both wires in a glass of water. Hydrogen bubbles will appear at the *negative* wire. Moisten a piece of litmus paper with water and apply both incoming wires, and the part under the *positive* wire will turn red. Care must be used to keep the wires apart, as otherwise a short circuit would result with disastrous results.

A great saving in expense by using this interrupter is assured, as we recommend the use of German silver wire in place of platinum points.

In adjusting the interrupter for use, expose 1-16th of an inch of the wire and gradually raise the porcelain tube by means of the thumbscrew until the proper spark length is produced from the coil.

This interrupter works equally well upon the alternating or direct current, and after the same is properly adjusted it requires no further attention except to renew the German silver wire as it is worn away during use, and the occasional raising of the brass contact weight as it works down upon the hard rubber thumbscrew.

We give formulae below for preparing the various solutions, which differ in accordance to the nature of the current supply as furnished by the various lighting companies. The interrupter will give best results when the jar is but half full of solution.

Formulae

For Direct Current, 110 volt.

Sulphuric AcidOne part.
Distilled WaterSeven parts.

For Direct Current, 220 volt.

Sulphuric AcidOne part.
Distilled WaterTen parts.

For Alternating Current, 110 volt, 60 cycle.

Sulphuric AcidOne part.
Distilled WaterThree parts.

For Alternating Current, 104 to 110 volt,
125 to 140 cycle.

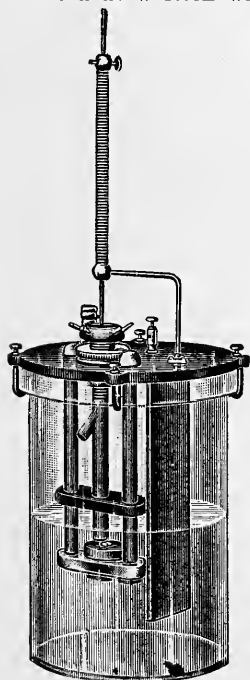
Sulphuric AcidOne part.
Distilled WaterTwo parts.

In preparing a solution for use in an Interrupter, the proportions given are by measure and not weight.

The solution should be mixed in a crockery or porcelain jar and not in the jar of the Interrupter, as it might have a tendency to crack the glass jar, caused by the heat generated when sulphuric acid and water are poured together.

As it is impossible to judge in every instance as to the resistance of the primary of the various coils, it may be necessary in some instances where the output of the coil is not as great as is expected, that a slight addition of acid or water may be required to perfect a solution as above given, but the formula as written will usually give excellent results.

No. 138. Price\$20.00
Extra wire, with $\frac{1}{2}$ inch of Platinum for use
on the direct current, if desired 1.50



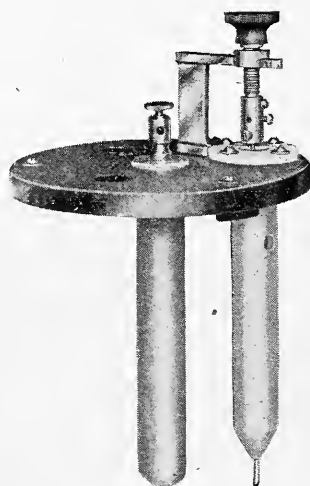
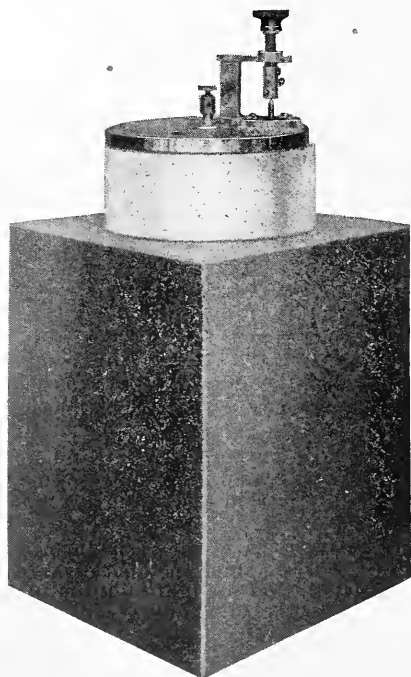
Western Electrolytic Interrupter

This type of interrupter has made it possible to employ an induction coil on the alternating circuit without the use of motor generator for converting the current. It is also of great value on the direct current where a large volume of current is desirable.

This interrupter differs but slightly from the R. F. Improved Electrolytic Interrupter and directions for controlling, installing, solutions, etc., will be the same as there described. When the spring is used instead of the weight to hold the feed wire steady, it should be given from three to four inches draw, and kept at this distance. As the wire is consumed by use, the spring will from time to time require adjustment.

No. 139. Interrupter, in case\$25.00
No. 140. With Water Cooling Attachment .. 30.00
No. 141. Hospital Size, with Water Cooling
Attachment 40.00

Scheidel Electrolytic Interrupter



The action of this interrupter is a result of a combination of the various phenomena caused by a set of electrodes suspended in a conducting liquid.

This type interrupter may be used on either direct or alternating current under the following conditions:

As acid interrupter for continuous current circuits of 110 and 220 volts.

As acid interrupter in conjunction with our water jacketed valve on alternating current circuits of all frequencies and voltages. For higher voltages than 120, the addition of a reduction transformer is recommended.

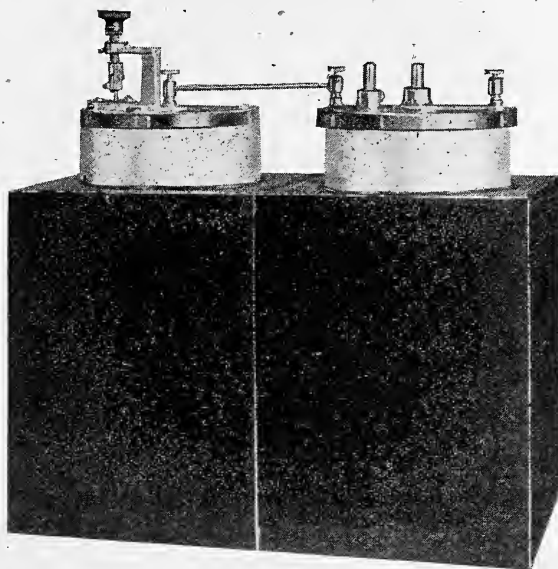
As "anti-acid" interrupter without valve for alternating current circuits of all frequencies and voltages. This type of interrupter is recommended in connection with induction coils for the production of X Rays for therapeutic purposes.

This interrupter is built in the most substantial and compact manner, provided with platinum points of liberal proportions, which have been determined under actual working conditions. It is provided with a water cooling jacket, thus insuring immunity from noise and all disturbances arising from overheating.

When ordering, it is absolutely necessary to state the type of coil with which the interrupter is to be used, as well as the properties of the electric current at the disposal of the purchaser, so the proper type of interrupter, with correct instructions of connection diagrams, can be selected.

- | | | |
|----------|--|---------|
| No. 142. | Electrolytic Interrupter with water cooling jacket, complete | \$25.00 |
| No. 143. | Porcelain Electrolytic Interrupter top with lead and platinum electrodes with adjusting parts as shown | 20.00 |

Water Jacketed Valve



Induction coils supplied with alternating current and used with an electrolytic interrupter should always have this apparatus connected into the primary circuit, as illustrated. It will be noticed that the valve itself is very similar in external appearance to the interrupter.

The valve is sent out complete with chemicals and instructions for installing, and needs hardly any maintenance beyond the occasional renewal of the cooling water and electrolyte. The same information required for the electrolytic interrupter should be given when ordering this instrument.

No. 144. Water Jacketed Electrolytic Interrupter and Rectifying
Valve for use on any alternating current\$50.00

Rheostats for the Alternating and Direct Currents



These rheostats have an ohmic resistance ranging from 8 to 180 ohms, with a carrying capacity of from 10 to 30 amperes. The framework is of iron which is perforated to allow a perfect circulation of air. The upper portion or top is of half-inch slate, marbled finish. A series of leads run from the resistance coils to the circle of buttons which number thirty in all. A lever is furnished which may be removed from button to button, thus cutting out or throwing in resistance at will. To the bottom of the framework is attached four lugs for fastening the device to the wall or table as desired.

No. 145.	8-ohm, 15-ampere, for alternating 100 to 110-volt current..	\$25.00
No. 146.	8-ohm, 30-ampere, for alternating 100 to 110-volt current..	30.00
No. 147.	90-ohm, 10-ampere, for direct 110-volt current.....	25.00
No. 148.	180-ohm, 10-ampere, for direct 220-volt current	35.00
No. 149.	30-ohm, 30-ampere, for direct and alternating 100 to 110-volt current	35.00

**Motor Speed Controlling Rheostat
for 110-Volt Direct Current
Interrupter Motor**

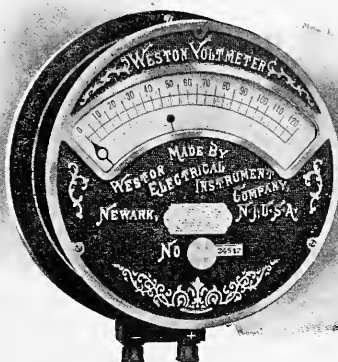


**Motor Speed Controlling Rheostat
for 220-Volt Direct Current
Interrupter Motor**



No. 150.	Motor Speed Controlling Rheostat for 110 volts, direct current, interrupter motor	\$5.00
No. 151.	Same as above, but for 220 volts	7.00

Voltmeter



No. 152. Price, \$30.00 Net

If in doubt regarding the voltage of your cells or of the electric lighting current which you may have in your office, you can know to a certainty the electric motive force by connecting a Voltmeter into the circuit.

Ammeter



No. 153. Price, \$25.00 Net

This instrument is designed to show by direct reading the number of amperes of current which are passing through a circuit. It is used more particularly in experimental and laboratory work as well as to indicate currents passing through coils.

Milliampere-Meter

We have a Milliampere Meter for X Ray tubes similar to the above which indicates the milliamperes of current passing through an X Ray tube.

Price\$25.00 net

**Volt Meter**

Diameter of Case, 9 inches.

Length of Scale, 6½ inches.

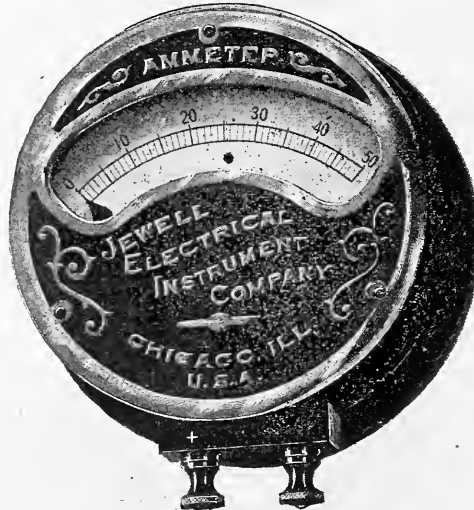
No. 154. 0-150 Volts in 1-Volt divisions\$23.00

**Ammeter**

Diameter of Case, 9 inches.

Length of Scale, 6½ inches.

No. 155. Price\$25.00



The above cut illustrates a cheaper grade of volt meter and ammeter.

Ammeters

No.	SCALE	Price
156	0-10 Amp. in $\frac{1}{10}$ Amp. div...	\$15.00
157	0-25 Amp. in $\frac{1}{4}$ Amp. div...	15.00
158	0-50 Amp. in $\frac{1}{2}$ Amp. div...	15.00
159	0-75 Amp. in 1 Amp. div...	15.00
160	0-100 Amp. in 1 Amp. div...	15.00
161	0-150 Amp. in 2 Amp. div...	15.00

Volt Meters

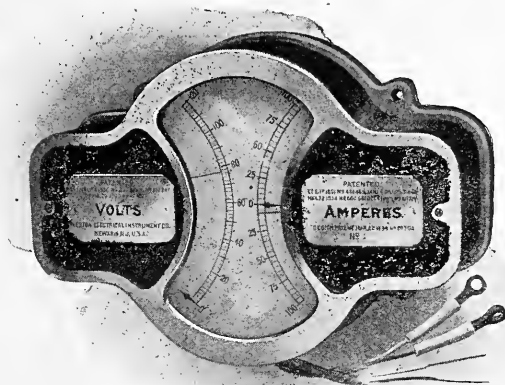
No.	SCALE	Price
162	0-3 Volt in $\frac{1}{30}$ Volt div....	\$15.00
163	0-6 Volt in $\frac{1}{20}$ Volt div....	15.00
164	0-15 Volt in $\frac{1}{10}$ Volt div....	15.00
165	0-50 Volt in $\frac{1}{2}$ Volt div....	15.00
166	0-125 Volt in 1 Volt div....	15.00
167	0-150 Volt in 1 Volt div....	15.00

Laboratory Instruments

We make a full line of Ammeters, Milli-Ammeters, Volt Meters and Milli-Volt Meters for special laboratory use, where the maximum results obtainable in the accuracy of readings in such instruments are demanded, and which accuracy can only be obtained by the use of a much longer index and consequently longer scale than can be put into a portable instrument.

Our laboratory instruments are made in two sizes, viz., eight inches in diameter with a 7½-inch scale, and 14 inches in diameter with a 13-inch scale.

These instruments are exactly similar in general appearance and construction to our portables, differing only in point of size. Prices on application.



Combined Volt and Amperemeter for mounting on tables or switchboard cabinets. Direct current circuits to 220 volts.

- No. 168. Combined Volt and Ampere Meter for mounting on table or switchboard cabinets, direct current circuits to 220 volts..\$50.00

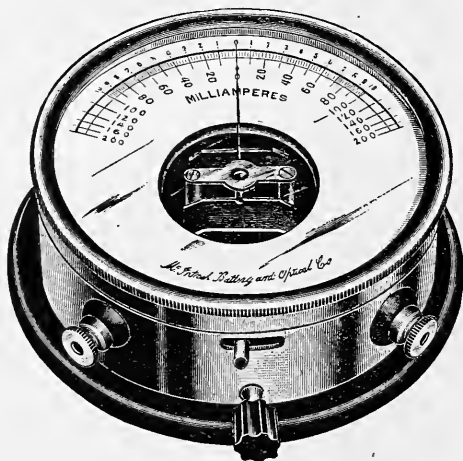


Hot Wire Volt or Amperemeter for mounting on tables or switchboard cabinets. Alternating current circuits to 220 volts, all frequencies.

- No. 169. Hot Wire Volt or Ampere Meter for mounting on tables or switchboard cabinets, alternating current circuits to 220 volts, all frequencies\$30.00

Improved Milliampere-Meter

Carpenter-Deprez Type with Shunt



This instrument does not vary in its construction from the regular form, except in the introduction of a shunt to permit of the use of a scale, reading 0 to 20 milliamperes, each small subdivision being $\frac{1}{2}$ milliampere. This shunt is controlled by a plug in the front of the case of the meter.

When the plug is in the reading is from the lower scale, figures in black, each scale subdivision being 4 milliamperes.

When the plug is out the reading is from the upper scale, figures in red, each scale subdivision being $\frac{1}{2}$ milliampere.

The range of reading upon the lower scale is from 0 to 400 milliamperes.

We recommend this shunt combination meter as very satisfactorily supplying the need experienced by some practitioners, particularly those devoted to the more delicate operations of the eye and the brain, where currents of a fraction of a milliampere may be required, and it is desired to have subdivisions of the scale so divided as to make the reading of fractions of a milliampere easily legible.

Combining as it does two instruments in one, there is probably no instrument on the market offering the wide range of reading and accuracy of measurements at so low a price.

Scale in Black 0 to 400. Scale in Red 0 to 20

No. 170. Diameter $5\frac{1}{4}$ inches. Price\$12.00

Milliampere-Meter



It has but recently been possible to secure a reliable meter to measure currents of high and other frequencies. The value of an instrument of this sort must be conceded by all. For all-round work, the one illustrated is without a peer. It will record accurately the dosage on any current which a physician may wish to administer, galvanic, faradic, static, high frequency and X Ray.

The meter has a high and a low scale, the former reading to 2,500 milli-amperes, and the latter to 250. The case is of beautifully finished brass, and is mounted on an oak base.

Directions for Operating

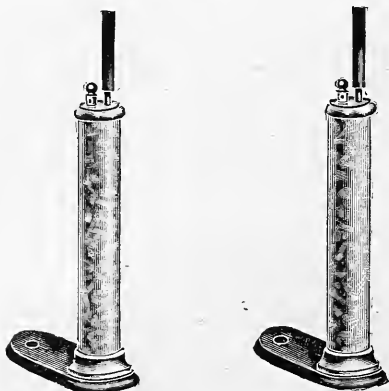
The instrument has two scales or readings. The upper scale is printed in black, the lower scale in red.

To operate, connect one wire to the lower right-hand post. This post is nickel and is common to both scales. The lower left-hand post is black and to which the other wire should be attached if the milliampereage is low and the black or upper scale is used.

If the milliampereage is above 250, the lower or red scale must be used, and to operate, turn down the lower screw in the upper left-hand corner and connect the red and the nickel posts.

No. 171. Price\$30.00

Multiple Spark Gap

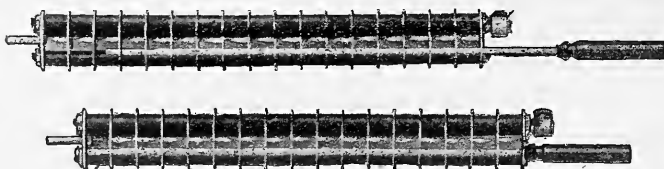


It is very convenient and sometimes necessary to place resistance in the circuit between the coil and X Ray tube. As the only resistance available for high potential currents, such as are generated from the secondary of a large coil, is a series of air gaps, attachments known as "multiple spark gaps," are placed in the circuit. Raising the rod, thus increasing the number of air spaces, has the effect of cutting down the secondary current. When using an X Ray tube which has comparatively low vacuum, the penetrating power of said tube can be very much increased by the use of these gaps.

Operators, after having used them a short time, would scarcely know how to adjust a coil for an X Ray tube without them.

No. 172.	Price per set with glass tube	\$10.00
No. 173.	Price per set with mica tube	18.00

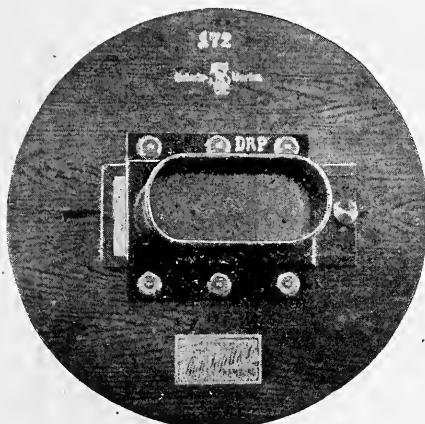
Another Type of Multiple Spark Gap



This device is invaluable particularly when operating the induction coil with an electrolytic interrupter with alternating current. Inverse discharges are an impossibility with these spark gaps, the life of the tube being materially lengthened by their use. They are of great service when using tubes of low vacuum, as very little X Rays are produced without them. In use they are connected directly to the secondary binding posts on top of the coil according to the mark "P" (positive) or "N" (negative), and the tube cords are attached to the free ends. The adjusting rod is then drawn out, thus inserting a larger or smaller number of "point and disc" spark gaps into the secondary circuit.

No. 174.	Adjustable Aluminum Spark Gaps as adopted by the International Congress, a spark from point to plate, will not oxidize from continuous use, suitable for any size coil, per pair.	\$6.00
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The Walter Penetrometer



By use of the Penetrometer, it is possible to ascertain accurately as to whether the penetrating qualities of a tube are sufficient for the work to be performed.

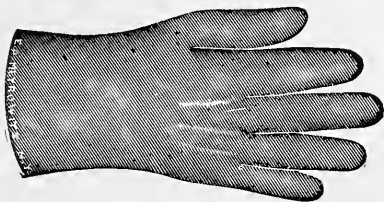
The Penetrometer consists of different layers of opaque material all of the same thickness but arranged one upon the other in the form of steps, so that the X Rays will penetrate these layers, showing a series of holes from which the reading is obtained.

If one or two holes only are discernible it denotes a low tube and one suitable for superficial treatments; if three or four holes can be

No. 175. Price\$35.00

perceived, the tube is suitable for radiographing the extremities or for the treatment of breast cases and when six holes or above are observed it is considered a high tube and of sufficient penetrating properties for radiographing the pelvis or the denser parts of the body.

As this Penetrometer has been adopted as the standard in Germany, many American operators have accepted it as a guide for their work, as it serves a means for measuring tubes which have heretofore been denoted as of a low, medium or high vacuum.



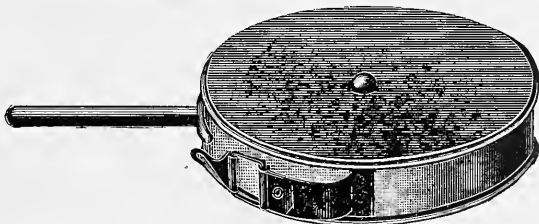
Dr. Price's Opaque Gloves

For the protection of the hands of operators Ray burns, against X being both opaque and a non-conductor.

Made in three sizes, Nos. 3, 4 and 5.

No. 176. Price, per pair\$5.00

Steel Tape Tube Terminals



These terminals are 6 feet long. They may be attached to any coil.

The case is self-winding and is controlled by pressing the small button as shown in cut.

No. 177. Price by mail, postpaid, per pair\$2.25

Operators' Protective Screen

74 Inches High by 31 Inches Wide.

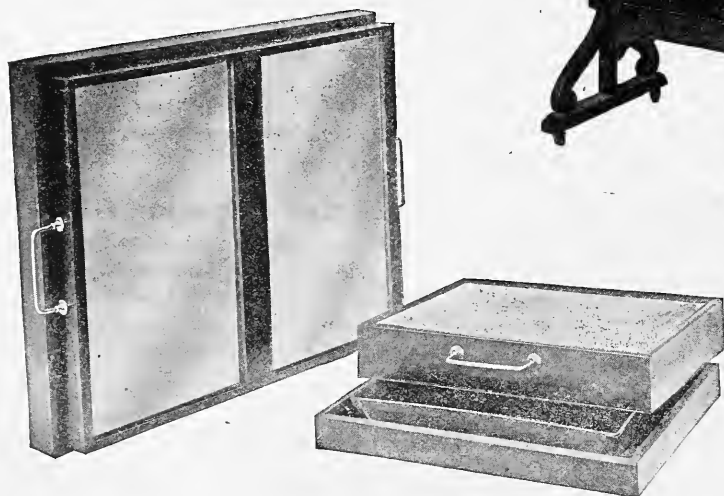
This screen is very elegant in appearance—it is made of heavy sheet lead, finished on both sides in pantasote. The glass window is of finest plate, $\frac{1}{4}$ inch thick, having a large percentage of lead in it which protects the operator's face but does not obstruct his view.

The screen is mounted on heavy casters. The scroll at top is hand carved. We make this screen in solid quartered oak, or birch mahogany finished.

No. 178. Price\$20.00



Light-Proof Aluminum Tray Holders



Are made in two sizes. No. 199 will take any size of tray up to 8x10 inches; No. 200 will take any size of tray up to 11x14 inches. The frames are made of well seasoned hardwood, finished in oil. The bottom and top are of very thick sheet aluminum. Being light, they are convenient to handle, and the aluminum will not tarnish by coming in contact with the developing solutions. We furnish these cases with both types of our developing titubators, which makes it possible to use the titubators outside of the dark-room. These light-proof cases are also used with much satisfaction by many operators who develop by hand.

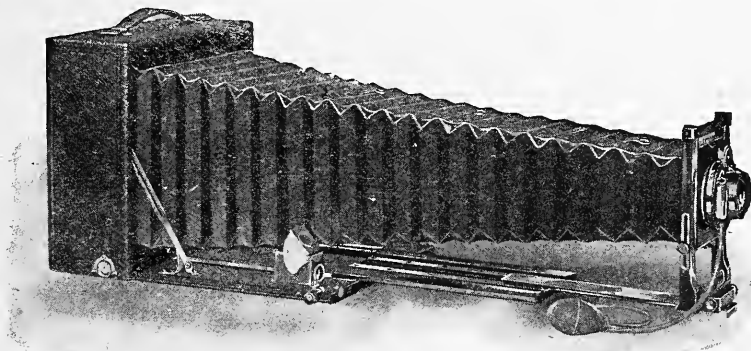
No. 199. 8x10\$3.00
 No. 200. 11x14 5.00

Ingento Camera No. 9



ANY times physicians are confronted with interesting cases presented for X Ray treatment, a complete record of which is highly important and would be of great value to their confreres if photographs could be made before and during the time the various treatments are given.

Others among the profession take pride in photography and desire first-class apparatus. To both classes, we desire to state that after careful investigation of the various cameras upon the market, we have selected the INGENTO type as the most satisfactory for all classes of work. The Ingento No. 9 embodies every feature known to camera art.



It is constructed in the best possible manner of selected mahogany, dovetailed together and handsomely covered with buffalo grain leather, the metal work being of brass, handsomely polished and lacquered.

The long bellows allows of close placing to object and a sharp, clear negative is the result. The lens is a triple convertible, fitted to the Wollensak Automatic Double Valve Shutter with removable lens board.

The Ingento No. 9 is made in three sizes: 4x5, 5x7 and 6 1/2 x 8 1/2.

Specifications

Camera Box—Mahogany, dovetailed and covered with buffalo grain leather.
Camera Bed—Triple extension, mahogany polished, and fitted with piano hinge.

Metal Parts—Highly polished brass, lacquered.

Bellows—Red Russia leather, lined with gossamer cloth.

Front—Double sliding, vertical and horizontal.

Clamp—Automatic press button.

Rack and Pinion—For focusing.

Swing—Either back or bed, operated with self-locking device.

Back—Reversible, with improved swing.

Finder—Brilliant, reversible, brass bound and hooded.

Shutter—Wollensak Automatic Double Valve.

Lens Board—Removable.

Lens—Triple Convertible.

Focal Capacity—4x5, 17 inches. 5x7, 24 inches. 6 1/2 x 8 1/2, 28 inches.

Prices

Including camera, carrying case with handle, and one double plate holder.

	No. 201, 4x5	No. 202, 5x7	No. 203, 6 1/2 x 8 1/2
Ingento No. 9, complete	\$35.00	\$44.00	\$58.00
Extra Double Plate Holders .....	.80	1.00	1.75

Smaller sizes quoted upon application.

Cramer X Ray Plates



THE Cramer X Ray Plates are used by the most prominent and successful radiographers in the United States and Canada.

Operators will find this plate reliable, uniform in result and easy of manipulation. On account of the double emulsified surface of the X Ray plate, great care must be used during the process of placing the plate within the envelope, prior to taking a skiagraph and also during the development of the negative. The plates are extremely sensitive and the operator is cautioned against exposing longer than is absolutely necessary.

The plates are packed in boxes with the emulsified surfaces together and not in paper envelopes, as the contact of the paper affects the sensitized surface and injures their keeping qualities.

Special List Per Dozen

We quote them with two and twelve sets of black and orange envelopes, but unless specified will send with twelve sets of envelopes.

	Sizes.	Doz. in Case.	With 2 sets Envelopes.	With 12 sets Envelopes.
No. 204.	4 x5	20	\$ 0.65	\$ 0.80
No. 205.	5 x7	12	1.10	1.40
No. 206.	5 x8	12	1.25	1.55
No. 207.	6 ½ x8 ½	8	1.65	2.10
No. 208.	7 x10	6	2.10	2.65
No. 209.	8 x10	6	2.40	3.00
No. 210.	10 x12	2	4.20	5.15
No. 211.	11 x14	2	6.00	7.25
No. 212.	14 x17	2	9.00	11.25
No. 213.	16 x20	1 ½	13.25	16.40
No. 214.	17 x20	1 ½	14.00	17.25
No. 215.	18 x22	1 ½	16.50	20.40
No. 216.	20 x24	1	20.00	24.65

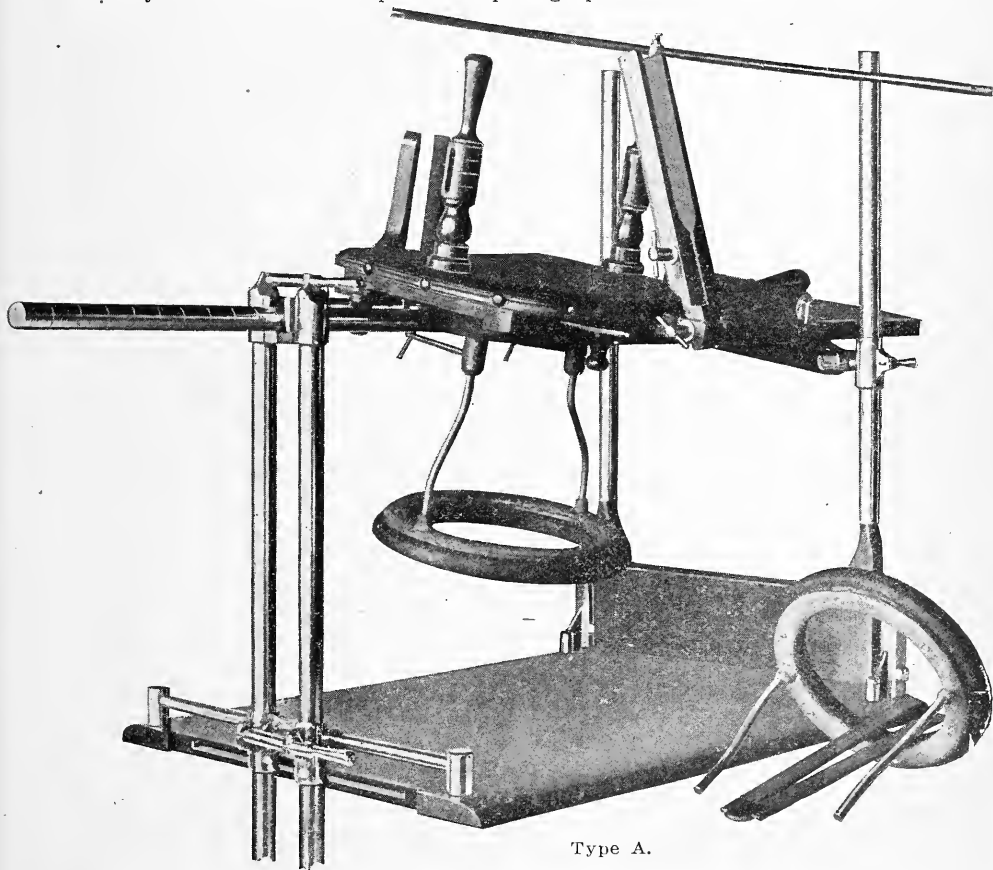
Packed ½ dozen in each box.

Improved Compression Diaphragm

For Radiographic Work and Stereoscopy, with Special Attachments for
Therapeutic Work



ALTHOUGH it is easy to secure X Ray photographs of superficial parts of the body, like the hand, wrist, elbow and ankle, by means of the X Ray tube alone, when we attempt to photograph deeper structures in adults, such as the hip, spine and shoulder, great difficulties are encountered through the diffusion of the X Ray throughout the mass of tissue which is interposed between the tube and the sensitive plate. In order to penetrate these masses of tissue a tube of high internal resistance must be used. These tubes produce rays of high radio-activity, not only from the focused point in the anode, but also from every point of the external surface of the tube which is in the plane of the anode. The result is that in using such a tube, clear pictures with sharp contrasts cannot be obtained, for the reason that these secondary rays are of such intensity that the plate is really fogged by them. For this reason it has been the effort of radiographers during the past few years to construct apparatus which would obviate this undesirable feature. All of the forms of apparatus which have been devised, and which successfully overcome this objectionable feature, have the disadvantages of being clumsy to handle and of being exceedingly expensive. The "K.-K." Compression Diaphragm has been constructed with a view to eliminating all these objections, and can be offered with the assurance that it is perfectly successful in doing so. The apparatus cuts out the active rays, excepting those which come from the anode itself, and, in addition, compresses the soft parts so that the anode may be brought as near as is practical to the body, and the object to be photographed may be pressed close to the sensitive plate. In doing this we also accomplish the absolute immobility of the tube and the part to be photographed.

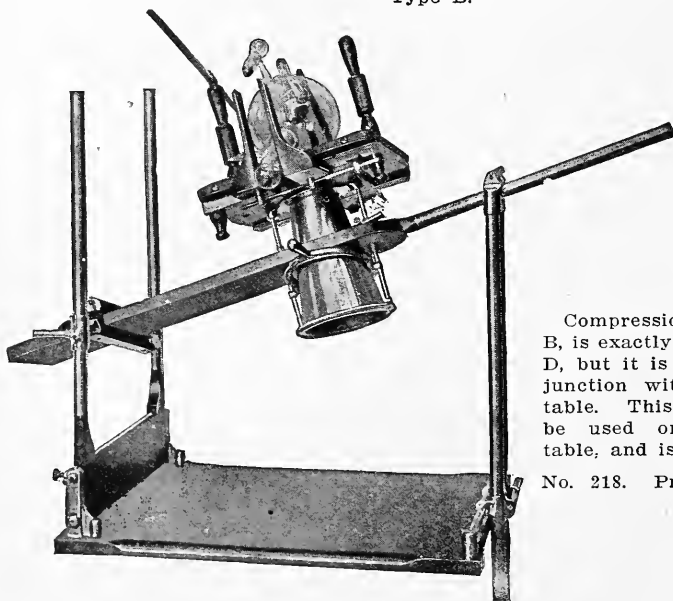


Type A.

The above cut (Type A) represents a Compression Diaphragm arranged for use on any patient's table with general adjustment which enables the operator to secure any position or any degree of angle.

No. 217. Price, net\$35.00

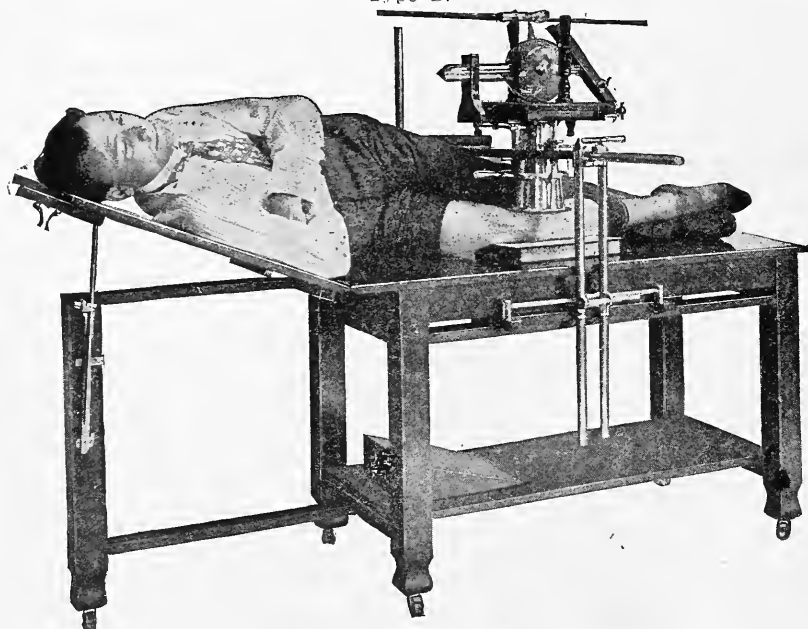
Type B.



Compression Cylinder, Type B, is exactly the same as Type D, but it is not built in conjunction with the adjustable table. This instrument may be used on any operating table, and is less expensive.

No. 218. Price.....\$50.00

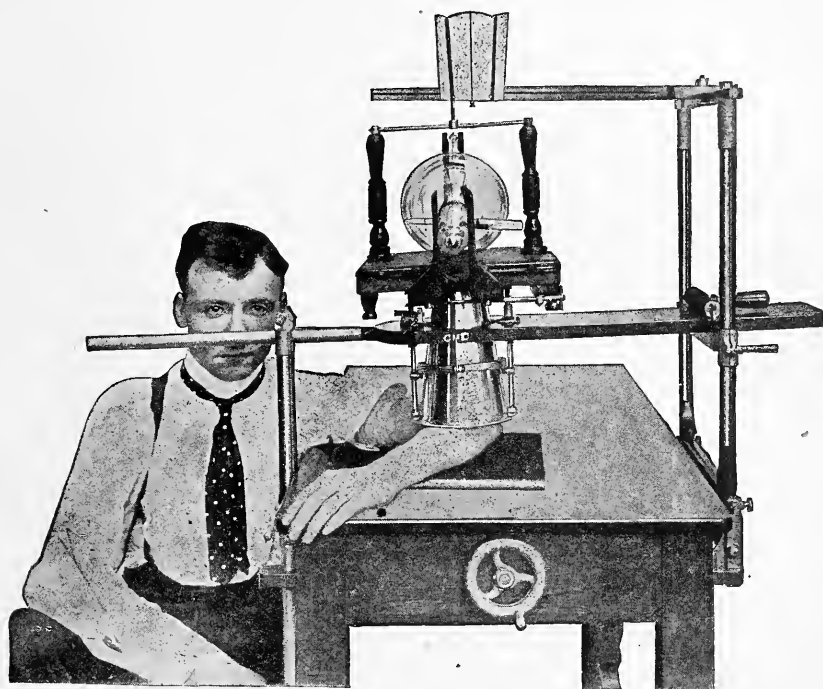
Type D.



The method of photographing a knee joint. Particular attention is requested to our special clamp for adjusting the wing of table above the horizontal.

No. 219. Table and Diaphragm\$85.00

Compression Diaphragm Showing Stereoscopic Attachment

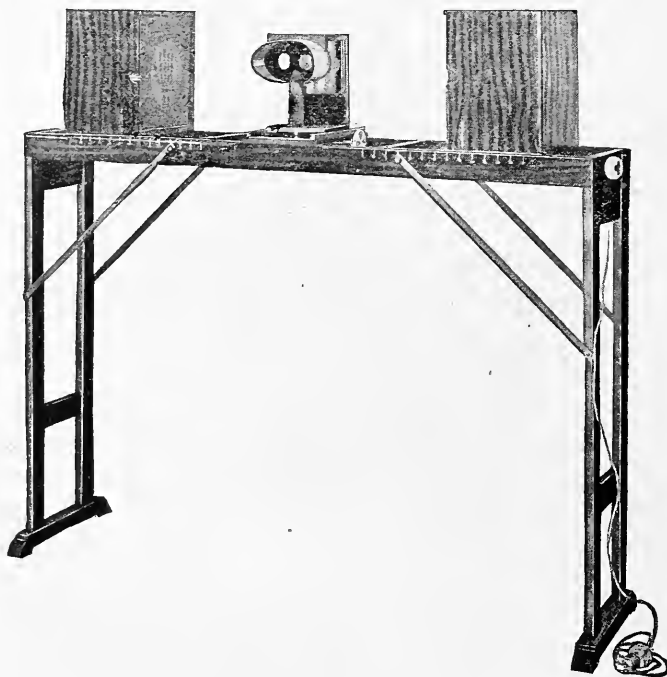


The stereoscopic attachment has been designed for use with both Type B and Type D Diaphragms. The adjustments are ample for photographing the hips or abdomen of any adult. The cylinder is shown above in position for making a stereoscopic picture of the elbow. After the first exposure has been made the exposed plate will be removed from the holder, which is shown on the table, a fresh plate inserted, the cylinder shifted so that the indicator will be parallel with the heavy line at opposite side of the dial; this done, all is ready for the second exposure. This quick and simple method of field finding is absolutely accurate.

No. 220. Price of Stereoscopic Attachment for use with Compression Diaphragm\$12.50

Adjustable Illuminated Reflecting Stereoscope

Automatic in Operation



The sliding scale of stereoscope is 4 feet in length, thus enabling the operator to view his work at full size or to reduce the image so small that the entire picture may be studied as a whole without shifting the center of vision. By means of a large milled head thumbscrew the prism may be adjusted so as to suit any vision, the same as an ordinary parlor stereoscope is focused. The two illuminators are adjusted simultaneously.

These instruments are manufactured for any or all sizes of plates, as may be specified in order. The frame of our stereoscope folds up for convenience in shipping, and they may be conveniently stored when not in use. Made in quartered oak and mahogany finish.

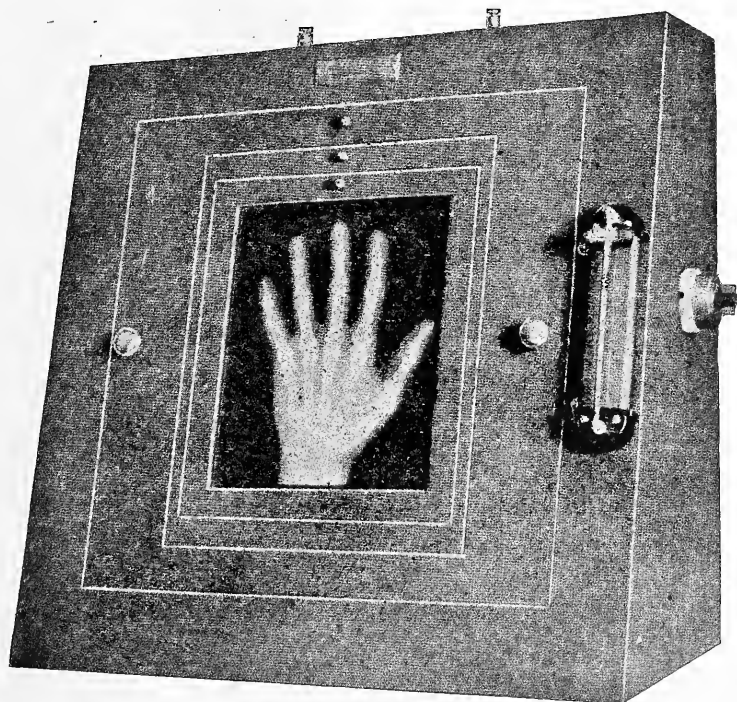
No. 222. Price\$40.00

Negative Examination Cabinet



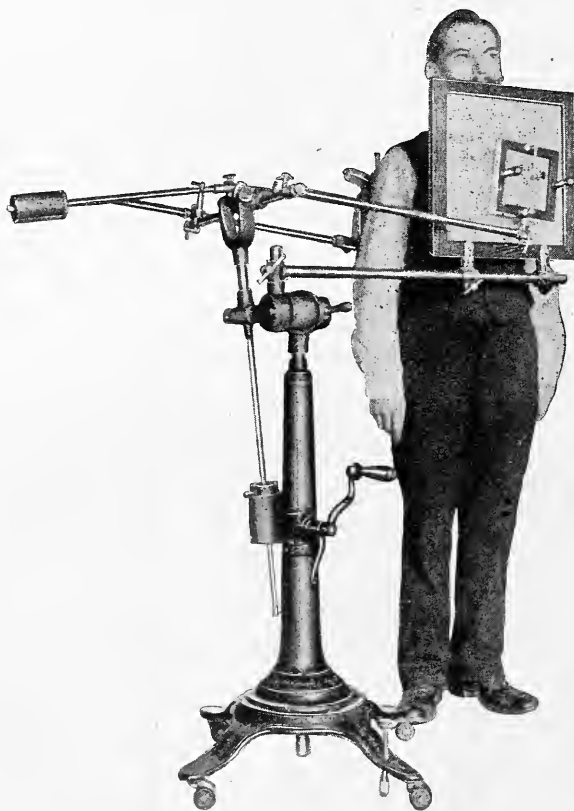
THE Negative Examination Cabinet is arranged so that negatives of various sizes may be examined. The cabinet is furnished either in mahogany or in cherry finish. A series of ground glass electrical globes furnish a white diffused light. The German silver rheostat (shown on the right side of the illustration) controls the amount of current passing to the lamps and thus regulates the density of light. The support for the negatives is so arranged that it may be revolved, enabling the operator to examine the negative in various positions.

The negative shows much richer details than can be brought out in the print and, being able to regulate the amount of light which percolates through the negative, various effects are secured. An operator once using the appliance would not be without it at any price.



No. 221. Price, \$20.00

The Orthodiagraph



The desire to reproduce the internal parts of the human organism without distortion, unavoidable in skiagraphic work, led to the invention of Dr. Moritz, known as the Orthodiagraph.

This instrument consists in its most essential parts of an adjustable frame open on one end, embracing the patient and a drawing board. The rear end of the frame carries an X Ray tube, the front end a fluorescent screen coupled with a drawing device. The whole arrangement is properly counterbalanced and placed upon a column in such a manner that it is possible to use it with the patient standing or lying on a suitable table or bed. Tube and pencil are so adjusted that a small number of rays practically free from divergence, are used to obtain a plan-parallel projection of the part by following the outlines with the pencil.

We are building this apparatus under the protection of United States patents, according to our own designs, which greatly simplifies its operation by reduction of parts, eliminating a number of perplexing features of the imported type. All parts are standardized and therefore interchangeable, while workmanship and finish are of the highest grade possible. This instrument is enjoying a growing popularity among the physicians of this country, especially among heart specialists, and we respectfully solicit inquiry regarding the use and advantages of this apparatus.

No. 223. Price\$150.00

Switchboards for X Ray Apparatus



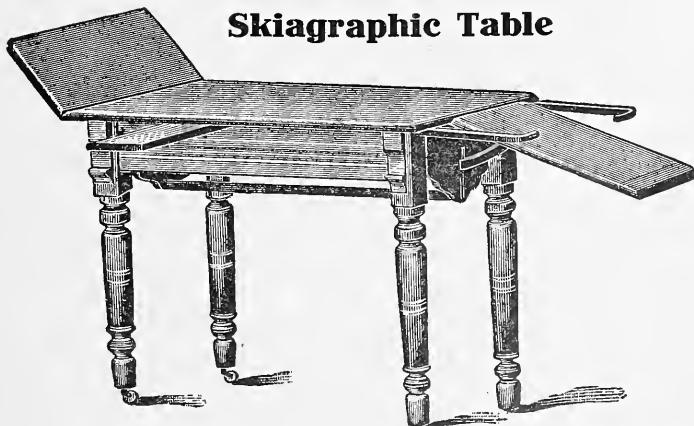
The cut represents a style of switchboard which is very popular and consists of Ammeter, Voltmeter, ruby lamp, fuse cut-out, coil rheostat and controller mounted upon a finely-finished slate base.

The inner construction is covered by perforated steel strips finished in oxidized copper.

We use nothing but metal, porcelain and asbestos in their construction.

No. 224. Price (size of base 24x30 in.) . \$150.00

Skiagraphic Table



The above cut represents the most convenient and compact form of Skiagraphic table that one can procure. It is arranged with an extension on either end, giving a total length of six feet (6 ft) when these are raised. Its shortest length when the extensions are lowered is forty-one inches (41 in.); width, twenty-four inches (24 in.).

No. 225. Price, without cushion \$10.00
 No. 226. Price, with cushion 15.00

Technique for X Ray Examination, Skiagraphs, and the Development of X Ray Plates



GOOD skiagraphs can be made with either a static machine or coil, the preference, however, is in favor of the coil, as by its use exposures are greatly shortened. For fluoroscopic work, the static is preferred by many, as the X Ray thus generated is more steady and not being associated with the ampereage, which characterizes X Ray work with coils, enables a patient to undergo exposure to the ray for a longer period with less danger of producing dermatitis.

In attempting to give suggestions for the use of the X Ray it must be borne in mind that the various apparatus in use today, be it coil or static, each will possess a certain idiosyncrasy of character that must be learned by its individual operator. The same coil apparatus and tubes, upon different currents and in the hands of different operators will require different manipulation, but with practice an operator will be able to judge just what his apparatus is doing by the sound given off by the interrupters or the steady hum from the revolving plate of the static, even if he be in a different room or giving his attention to the detail of his apparatus. Under no circumstance either skiagraphy or in giving treatment, should the operator leave his patient and give his attention to another case, trusting to return at the proper moment, for experience has shown that many fatal X Ray burns and disastrous results have resulted from this cause that might easily have been prevented if careful attention had been given the case in hand.

X Ray Tubes

With all apparatus, a good X Ray tube is essential for the work in hand. Best results are obtained by tubes that have been gradually hardened and able to stand the amount of current necessary for the case without the vacuum being effected. Several tubes must be provided as it is not best to work a tube for prolonged periods. After one or two exposures have been made allow the tube to rest until the next day. While this may appear to be an extra expense in the beginning, time will prove that it is economy in the end.

A soft tube is best for all conditions of work as it will bring out detail better than tubes of high penetration. It is best to expose a trifle longer and get what is sought than to use tubes of high penetration, thus permitting the ray to pass through the part rather than cast a shadow, which is desired. Skiagraphy means shadow, and it is the shadow of objects under consideration that we are seeking.

Fluoroscopic Examinations

Some physicians, upon purchasing an apparatus, expect to be able to make examinations of the whole body by means of the fluoroscope. This is a mistake that must be overcome at once. While the fluoroscope is convenient it should be used only for examinations of the upper and lower extremities, as all other parts should be skiagraphed. In no other way can successful examinations of the denser structures be given, and the patient is thus subjected to but short exposures of the X Ray.

In making a fluoroscopic examination, the patient can be seated. The clothing and bandages should be removed from the part undergoing ex-

amination, but if this is impossible, see that no metal buttons, pins, etc., are interposed between the subject and the screen. The fluoroscope must be placed directly upon the part examined and not separated from it, and the distance of the tube from the patient will be less than for making a skiagraph of the same part.

Skiagraphs

In making skiagraphs all clothing or bandages should be removed and the patient placed in the incumbent position, as he is then relaxed and less liable to move during the X Ray exposure. For fractures and the location of foreign objects it is best to take two skiagraphs of the part, one being at right angles to the other. This enables one to better locate what is being sought and allows no possible chance for the bone to overshadow or hide what might be just below its surface. The part to be skiagraphed must be in as close contact as possible to the plate, thus giving a much sharper shadow.

The exposure for chest work must be short and timed so that the skiagraph is made while respiration is suspended.

Skiagraphs for the diagnosis of biliary, renal and vesical calculi and the lower spine, are the most difficult to obtain, and great care should be exercised that all fecal matter is eliminated from the bowels and that the bladder is empty.

For this work the Compression Diaphragm is indispensable, as the secondary or diffused rays are eliminated; the direct rays, accurately focused, alone affect the plate. The exact circumference or area of the field for diagnosis is reproduced, the denser parts are compressed, thereby offering less resistance to the ray, with a tendency to avoid voluntary or involuntary moving.

It is always best to make two distinct negatives for comparison, and these separately rather than two plates at the same time by placing one upon the other. By so doing, there is less danger of mistake in reading the negative, for if a bubble or defect should appear in one it would not be liable to show in the other at the same place.

Preparing the Plates

The plates should be placed in the envelopes in the dark room. The plate, with the emulsified surface up, is first slipped within the black envelope against the smooth surface, the seams of the envelope being back. This is then placed within the buff envelope, the tab or open end introduced first with the smooth surface on the top.

Technique

The apparatus, tube and patient being arranged, the plate is placed under the part to be skiagraphed so that the suspected area is in the center of the plate. The tube is so arranged that the anode is parallel to the surface of the plate and the distance ranging from 12 to 20 inches, depending upon the part to be skiagraphed. In estimating the distance, a safe rule for guidance is that the anode of the tube should be at least as far above the plate as the length of the object that is to be skiagraphed. In other words, suppose that it is the elbow or knee that is to be skiagraphed. It is always desirable to get at least seven or eight inches of the bone each side of the

joint. The proper distance, therefore, will be that the anode will measure fourteen to sixteen inches from the plate. The shoulders of an adult, from tip to tip, usually measure eighteen inches, and are shown in skiagraphs of the chest. The anode of the tube should, therefore, be eighteen inches from the plate, directly over the median line, and if these precautions are given, natural negatives will result and there need be no occasion to fear a distorted image.

We append a table of comparative exposures for skiagraphs made with a 12-inch coil, fitted with both a mercury and an electrolytic interrupter. Larger coils will cut this estimate down in proportion to their spark lengths and the amount of current passing to the primary. For exposure with a static machine it is safe to give eight times the exposure as here noted with the electrolytic interrupter.

Mercury Interrupter

Distance of anode of tube		
Part.	from plate.	Exposure.
Hand.....	12 inches.....	5 to 10 seconds.
Foot.....	12 inches.....	10 to 15 seconds.
Knee.....	15 inches.....	20 to 30 seconds.
Chest.....	18 inches.....	45 to 60 seconds.
Shoulder.....	15 inches.....	1 to 2 minutes.
Hip Joint.....	20 inches.....	3 to 5 minutes.

Electrolytic Interrupter

Distance of anode of tube		
Part.	from plate.	Exposure.
Hand.....	12 inches.....	1 to 2 seconds.
Foot.....	12 inches.....	2 to 5 seconds.
Knee.....	15 inches.....	5 to 15 seconds.
Chest.....	18 inches.....	1 to 3 seconds.
Shoulder.....	15 inches.....	10 to 30 seconds.
Hip Joint.....	20 inches.....	1 to 2 minutes.

The above exposure is based upon a patient weighing 200 pounds. Coil operating upon the direct current and drawing 10 amperes through the primary, electrolytic interrupter, Friedlander 8-inch heavy anode regulating tube.

Warning

We believe that it is very important to call the operators' attention to the fact that most X Ray casualties, so far as the operator is concerned, are caused by placing the bare hands in the hypo solution when fixing X Ray plates. This is the most dangerous part of X Ray work for the operator whose hands have already been affected by X Ray dermatitis or who has the so-called X Ray hands, and it can be avoided by wearing rubber gloves when developing plates.

The Development of the Plate

In the development of the X Ray plate the operator must use every care to exclude all light from the dark room, and be sure that the artificial light apparatus, which is necessary, is properly shaded. If this light is too strong a thickness of orange-colored paper over the ruby light will tone it down nicely.

After the plate is removed from the envelope it is placed in a suitable tray, with the exposed surface on top, and enough developer poured over to nicely cover the same. If a titubator or the illuminating table is used, it can be rocked automatically, otherwise the tray containing the plate must be rocked by hand, allowing the developer to wash back and forth across the surface of the plate. Air bubbles must be covered by touching with cotton or camel's hair brush moistened with the developer.

Care must be exercised in having all trays thoroughly cleansed and the developer of the proper temperature, which should be 75 degrees Fahrenheit in winter and 60 degrees in summer.

The detail in skiagraphs of the pelvis, abdomen, and of the denser structures, appears much more slowly than in plates of the chest and extremities, and must be carried much farther. If the bony structures are sought, the softer tissue, as tendons, muscles, etc., are lost, but if detail of the softer tissues are desired, the bony structure will not be so well outlined. When the detail appears upon the plate and is just about to recede, remove the plate from the developer, rinse it thoroughly in running water, and examine by holding the plate before the ruby light. If the plate is not as clear as desired, place it in the contrast developer, after which rinse and place it in the fixing solution.

Operators, after a time, usually hit upon a formula for a developer which is exactly suited to their plates, but, as a guidance to beginners, we append formulae which have been most successfully used by radiographers of note.

Edinol, or the old familiar Metol-Hydrochinon, give excellent results, and are both to be depended upon. The Metol-Hydrochinon formula, as given below, is the one used by Mr. A. L. Moore, consulting photographer, of Washington, D. C.

Sodium Sulphite (dry)	9 ounces.
Sodium Hyposulphite (dry) ..	5 drams of a 20% solution.
Potassium Bromide	$\frac{1}{2}$ dram.
Potassium Carbonate	3 ounces.
Hydroquinon	1 $\frac{1}{2}$ ounces.
Metol	$\frac{3}{4}$ ounce.
Water	120 ounces.

Dissolve each chemical separately in a small quantity of warm water, and into a large container pour the solutions in the order named and add sufficient water to make the finished product measure 7 $\frac{1}{2}$ pints, or 120 ounces.

A good contrast developer is made as follows:

Sodium Sulphite (dry)	3 ounces.
Sodium Carbonate (dry)	2 ounces.
Potassium Bromide	60 grains.
Hydrochinon	$\frac{1}{2}$ ounce.
Water (warm)	40 ounces.

Dissolve separately and mix in the order named.

Fixing Bath

As a fixing bath nothing surpasses the solution of sodium hyposulphite, prepared as follows:

Sodium Hyposulphite	1 pound.
Water	4 pints.

Edinol Developer

Mr. Charles Brush, E. E., radiographer at the Metropolitan Hospital, New York City, kindly submits the following formula for a developer, which he has used for the past four years with very satisfactory results.

It is to be used with Cramer Instantaneous, Iso, and Trichromatic X Ray plates, and gives a rich contrast with a uniform dense grain and an even black tone.

Stock Solution

Acetone Sulphite	225 grains.
Sodium Sulphite (dry)	750 grains.
Edinol	75 grains.
Potassium Bromide	40 grains.
Potassium Carbonite (dry)	750 grains.
Water (warm)	17½ ounces.

Dissolve the chemicals in the order named.

To Develop Plates of Normal Exposure

Formula as above given.....	One part.
Water	Five parts.

To Develop Under-Exposed Plates

Formula as above given	Two parts.
Water	Five parts.

To Develop Over-Exposed Plates

Formula as above given.....	One part.
Water	Ten parts.

Development can be carried to the utmost, as the formula has no tendency to fog the plate.

For Fixing Bath

Fixing Salt, Bayer	4 ounces.
Water	16 ounces.

After fixing and washing, if the detail is not clear, place the plate in an intensifying solution, as follows:

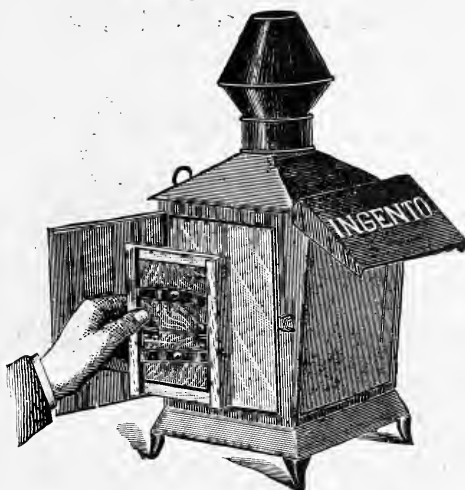
Intensifier, Bayer	70 grains.
Water	4 ounces.

The final washing of the negative should be most thorough, the plate remaining in running water for one hour. The plate washer, as shown on page 98, being especially useful, as, after the washing, by means of the tilting rack, the plates are rinsed and drained without unnecessary handling.

Failure to obtain good negatives is due to over or under-exposure, faulty developer, the same being weak, too old, or the chemicals impure.

For the physician to be successful in his skiagraphic work, it requires a thorough knowledge of his apparatus and tubes, good plates, care and cleanliness in developing, combined with patience, perseverance and practice.

Ruby Lantern



A lantern "par excellence" for a well equipped dark room. Outside measurement of dark room lamp: Base, 8 inches square; height, including chimney, 18 inches; size of front ruby glass, 7x9 inches. The front is fitted with three glasses, ruby, orange and ground, giving a perfectly safe volume of light. These glasses are removable, so that any modification of light can be secured.

The lantern is fitted with a door on each side. The one on the right contains a ruby light, which illuminates any part of the dark room in that direction. On the other side of the lamp is fitted a ground glass, to be used in the printing of developing papers, bromide papers or transparencies.

The light can be entirely shut off by the closing of the door on this side. The Ingento Lanterns are fitted with Gas Burner or Kerosene Oil Lamp with Circular Wick Burner and Glass Chimney. The shade can be adjusted and clamped at any point desired.

Either light can be regulated from the outside.

The lantern is beautifully enameled in black and striped in yellow.

Oil lamps supplied, unless otherwise ordered.

No. 227. Price\$5.00

The Ideal Ruby Oil Lamp



These lamps are made on the improved and most scientific plans, giving a volume of light never before obtained in this style of lamp. They are regulated and filled from the outside, and they are fitted with a new patent burner which insures perfect combustion without smell or smoke. The front is fitted with both orange and ruby glass, making them perfectly non-actinic.

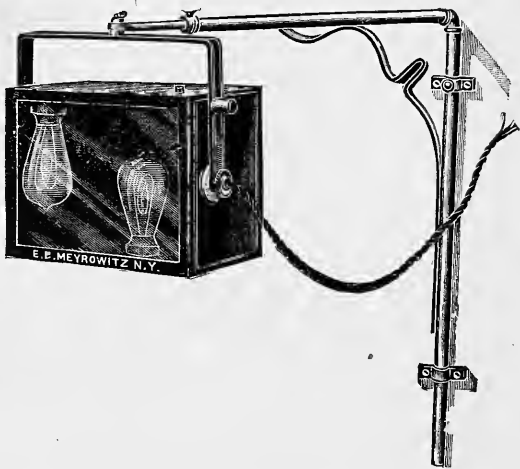
No. 228. Price\$1.00

No. 229. Extra large, price 1.50

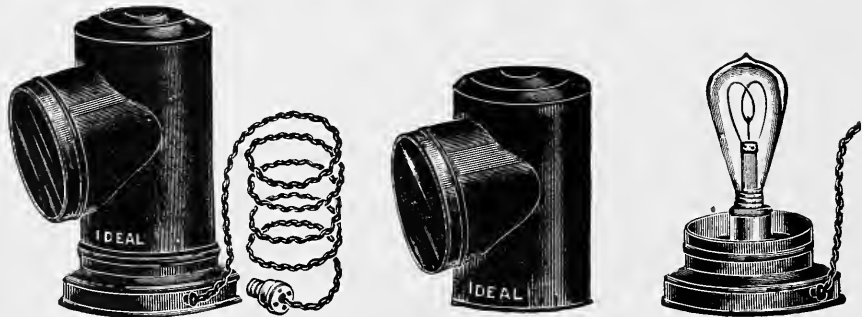
Caldwell Ruby Lamp

The accompanying cut illustrates a very desirable accessory to the dark room equipment, in the shape of a ruby lamp box. As it is very necessary to use a subdued light occasionally in examining an X Ray plate during the process of developing, at the same time exposing it to as little light as possible, this lamp is so arranged that it can be thrown to one side or tilted to any position desired. The case is also supplied with a switch, by means of which the light can be turned on or off at will without leaving the table.

No. 230. Price, complete. \$18.00



The Ideal Electric Ruby Lamp



This lamp will be greatly appreciated by those who can secure electric connections in their dark rooms. It is made of heavy tinplate and handsomely copper oxidized. The lamp is fitted complete with 8 candle power incandescent lamp and wiring with connection, which can be attached to either the Edison, T. & H. Westinghouse, or other sockets.

The lamp is fitted with three glasses, orange, ruby and ground, either of which can be instantly removed so that the light can be adapted to the class of work on hand. As the metal cap, into which the glasses are fitted, can be slipped off and on quickly, this will be found the ideal lamp for all-around work.

When ordering, specify for what socket lamp is wanted.

No. 231.	Price	\$2.50
	Extra Glasses .....	.10
	Extra 8 C. P. Bulbs .....	.35

Hard Rubber Trays



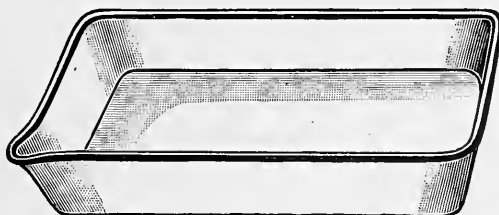
For most purposes these hard rubber trays are the best, as they are made of pure rubber (vulcanized). They cannot be attacked by any acid or chemical. They will last a lifetime, although constantly used. They are light and strong and if accidentally broken can be repaired by revulcanizing. Where trays are in constant use, these will be found the most economical.

They are made in two grades, up to and including the 12x16 sizes, the difference being in the depth of the respective trays, the Ideal being the more shallow of the two.

Ideal Hard Rubber Trays

No.	Size	Price Each	No.	Size	Price Each
232	4 $\frac{1}{4}$ x5 $\frac{1}{4}$	\$0.50	236	8 $\frac{1}{2}$ x10 $\frac{1}{2}$	\$1.21
233	5 $\frac{1}{4}$ x7 $\frac{1}{4}$.....	.61	237	10 $\frac{1}{2}$ x12 $\frac{1}{2}$	1.82
234	5 $\frac{1}{2}$ x8 $\frac{1}{2}$.....	.72	238	12 x16	3.03
235	7 x9 .....	.94			

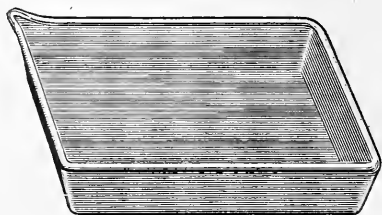
Steel Enameled Trays



These trays are made of heavy sheet steel, stamped up out of one piece, and have no seams or joints. They are quadruple coated with white porcelain enamel and are guaranteed acid and chemical proof, which means that we will replace any of these trays which may prove defective. The rim is coated with blue enamel, which makes the dish very attractive. They are very light, strong and durable, and are far superior to any goods of this kind heretofore offered.

No.	For Plates	Inside Measure	Price Each	No.	For Plates	Inside Measure	Price Each
239	5 x 7	5 $\frac{1}{2}$ x 7 $\frac{1}{2}$ x1 $\frac{1}{2}$	\$0.50	245	14 x17	15 $\frac{3}{4}$ x19 $\frac{3}{4}$ x2 $\frac{1}{4}$	\$3.75
240	6 $\frac{1}{2}$ x 8 $\frac{1}{2}$	7 $\frac{1}{2}$ x 9 $\frac{1}{8}$ x1 $\frac{5}{8}$ .....	.75	246	16 x20	16 $\frac{1}{2}$ x20 $\frac{1}{2}$ x2 $\frac{1}{4}$	4.50
241	8 x10	8 $\frac{3}{4}$ x11 x1 $\frac{3}{4}$	1.13	247	18 x22	19 $\frac{3}{4}$ x24 $\frac{1}{2}$ x2 $\frac{1}{2}$	6.00
242	10 x12	11 x13 $\frac{3}{4}$ x2	1.70	248	20 x24	20 x24 $\frac{3}{4}$ x2 $\frac{1}{2}$	7.00
243	11 x14	12 $\frac{5}{8}$ x14 $\frac{5}{8}$ x2	2.25	249	22 x27	22 $\frac{3}{4}$ x27 $\frac{1}{2}$ x2 $\frac{1}{2}$	9.00
244	12 x16	12 $\frac{5}{8}$ x16 $\frac{5}{8}$ x2 $\frac{1}{4}$	2.63				

Deep White Porcelain Trays



These trays are made of strong, heavy porcelain, with highly glazed surface. They are the correct thing to use for toning and washing prints, as it can be detected instantly if they are not perfectly clean.

No.	For Plates	Inside Measure	Price Each	No.	For Plates	Inside Measure	Price Each
250	4 x 5	4 $\frac{3}{8}$ x 5 $\frac{3}{8}$	.....\$0.50	255	10 x 12	10 $\frac{1}{8}$ x 12 $\frac{3}{8}$	.....\$1.66
251	5 x 7	5 $\frac{1}{2}$ x 7 $\frac{1}{2}$	..... .62	256	11 x 14	12 $\frac{1}{8}$ x 15 $\frac{3}{8}$	..... 2.64
252	5 x 8	6 x 8	..... .75	257	14 x 17	14 $\frac{5}{8}$ x 17 $\frac{5}{8}$	..... 6.60
253	6 $\frac{1}{2}$ x 8 $\frac{1}{2}$	7 $\frac{1}{2}$ x 10 $\frac{1}{2}$	..... .82	258	16 x 20	17 x 21 $\frac{1}{2}$	..... 8.00
254	8 x 10	8 $\frac{7}{8}$ x 10 $\frac{5}{8}$	..... 1.00	259	20 x 24	20 $\frac{1}{2}$ x 24 $\frac{3}{4}$	..... 12.00

Glass Funnels

Plain and patent fluted. The patent fluted funnels are most desirable when using filter paper.



PRICES

		Plain	Pat. Fluted
No. 260.	$\frac{1}{4}$ pint	\$0.12	\$0.12
No. 261.	$\frac{1}{2}$ pint	.15	.15
No. 262.	1 pint	.20	.20
No. 263.	1 quart	.25	.30
No. 264.	$\frac{1}{2}$ gallon	.40	.45

Ideal Glass Graduates



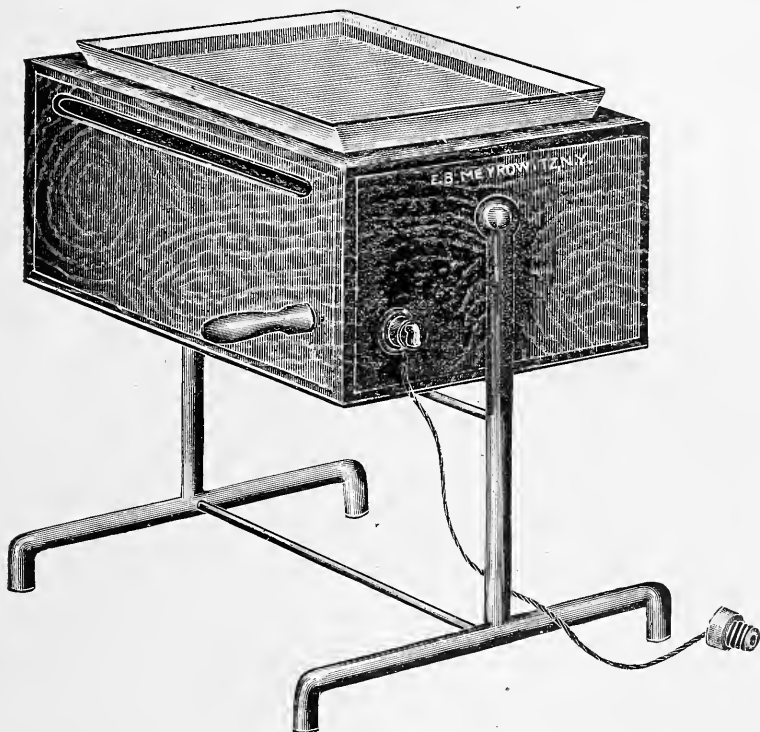
These graduates are specially made for photographic use. We guarantee them to be perfectly accurate. The lines are engraved, but the figures are molded in relief on the outside, so that they can be easily discerned in the dark room.

PRICES

No. 265.	1 ounce	.....\$0.20
No. 266.	2 ounce	..... .20
No. 267.	4 ounce	..... .25
No. 268.	8 ounce	..... .40
No. 269.	16 ounce	..... .60
No. 270.	32 ounce	..... 1.25

Developing and Illuminating Table

(Patents Pending)



For convenience and accuracy in developing an X Ray plate our patent developing table is superior to anything on the market. It combines both developing rocker and illuminating box, and is arranged with ruby electric lamps, together with plates of orange glass immediately under tray, so that at any time during the process of developing the plate may be examined under the most favorable conditions, without removing or disturbing it in any way. As it is best to admit as little light as possible, a snap switch is provided, so that the light may be turned off at will.

These developing rockers are made to be operated by electric, foot, or hand power, the latter being shown in above cut.

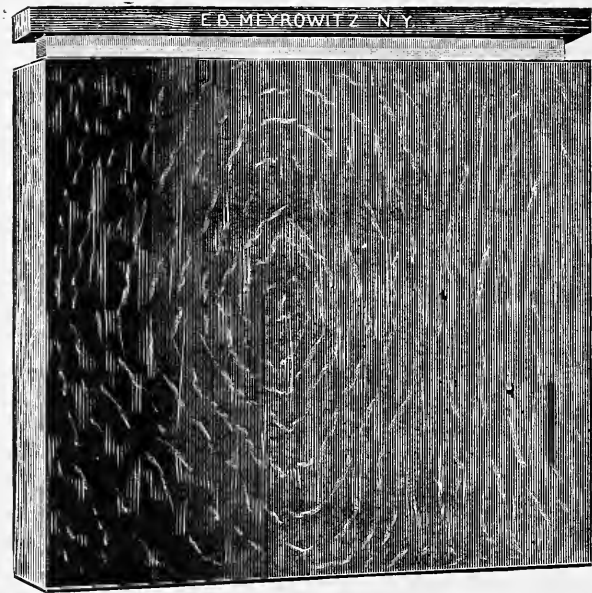
No. 271.	Price, for rocker to be operated by hand power.....	\$35.00
No. 272.	Price, for rocker to be operated by foot power.....	45.00
No. 273.	Price, for rocker to be operated by electric motor power, D. C., 110 volts	60.00

Above rockers are for plates 11x14 inches or smaller.

Larger sizes to order.

If dimming rheostat is desired, add \$10.00 to the above prices.

Lead Lined Box

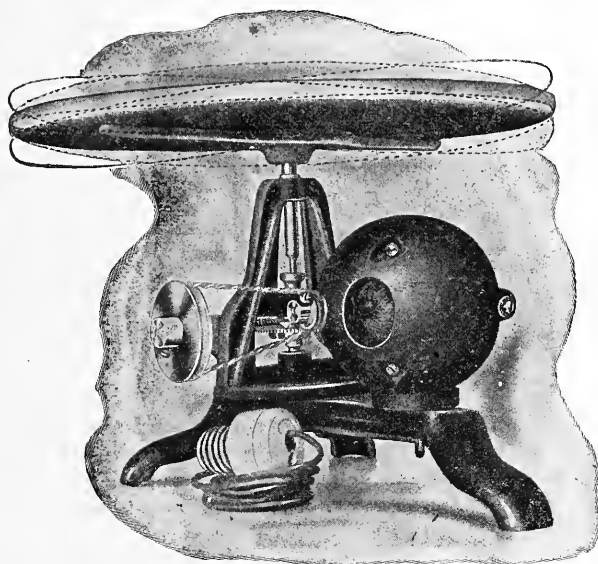


A lead-lined box for preserving sensitized X Ray plates is so convenient that very few operators feel that they can be without one. It not only saves unnecessary steps, but precludes all liability of damaging important work from carelessness, as without one it necessitates placing the plates a long distance from the apparatus to positively prevent their being fogged while the tube is being operated. It is well understood that X Ray plates must be kept some distance from the apparatus, unless they are carefully protected from the X Ray light by means of some heavy metal or other material which is absolutely opaque to these rays. The box illustrated above is for this purpose, and is a most valuable accessory to an equipment.

- No. 274. Price of box sufficiently large to receive plates up to 11x14 inches in size\$15.00
- No. 275. Price of box sufficiently large to receive plates up to 14x17 inches in size 18.00

These cases are all made of oak and finely finished.

Developing Titubator



Titubator No. 1

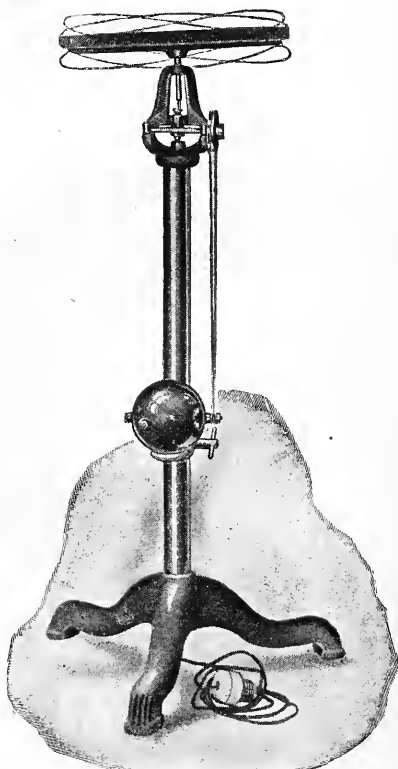
Is an absolute necessity in every radiographic laboratory. All radiographers have felt the need of some kind of mechanical device that would relieve them of the monotonous task of "tray shaking." The Developing Titubator will do it. This instrument is well and accurately made; it is self-oiling and almost noiseless in operation, and may be used on either direct or alternating current. Several plates may be developed at one time with but one titubator.

No. 276. Price...\$30.00

Titubator No. 2 has the same size shelf as No. 1, which is twelve inches in diameter, and the mechanism is the same.

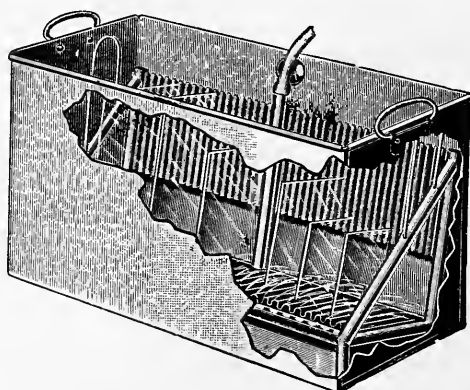
The principal advantage of No. 2 lies in the fact that it stands upon its own base and does not require shelf room or a special table upon which to use it. The castings are triple japanned, pointed in gold, while the other metal parts are heavily nickel plated. We furnish one 8x10 light-proof aluminum tray holder with either type of titubator.

No. 277. Price\$40.00



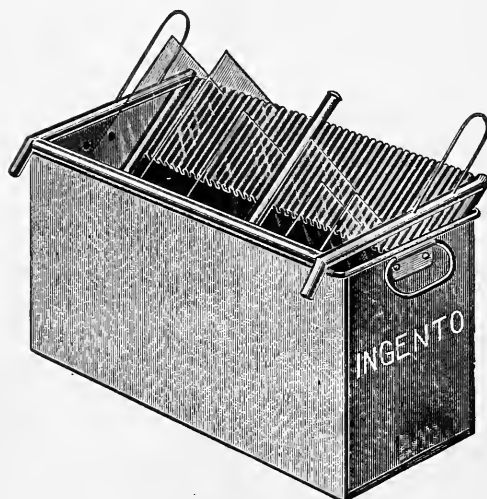
Titubator No. 2

The Ingento Plate Washer



An innovation in professional washing apparatus. Its distinctive features place it at the head of all wash boxes. The Ingento Washing Boxes will wash at one time any size negatives smaller than the largest size for which they are made. The cuts fully illustrate the method by which this is accomplished.

It will also be seen that the inside rack is tilted, so that it is impossible for the plates to be disturbed during the operation of washing. The water enters the box through two long tubes, which extend the full length of the box, one on each side. The tubes are perforated with holes every one-half inch, so that a stream of water is forced between each plate, thus insuring quick, perfect and uniform washing of each plate.



The inside rack can be lifted up and placed on top of the box, so that the plates can be drained and dried, as is shown in illustration. The 4x5 size is made entirely of zinc, but the larger sizes are made of galvanized iron, and are built extra strong to accommodate the large volume of water and increased weight of plates.

The inside rack can be lifted up and placed on top of the box, so that the plates can be drained and dried, as is shown in illustration. The 4x5 size is made entirely of zinc, but the larger sizes are made of galvanized iron, and are built extra strong to accommodate the large volume of water and increased weight of plates.

PRICES

No. 278.	For 25 plates, 4x5 or smaller.....	\$1.75
No. 279.	For 25 plates, 5x7 or smaller.....	3.75
No. 280.	For 50 plates, 5x7 or smaller.....	5.00
No. 281.	For 100 plates, 5x7 or smaller.....	7.50
No. 282.	For 30 plates, 8x10 or smaller.....	4.50
No. 283.	For 30 plates, 11x14 or smaller.....	6.00

Larger sizes made to order.

Camel's Hair Dusters

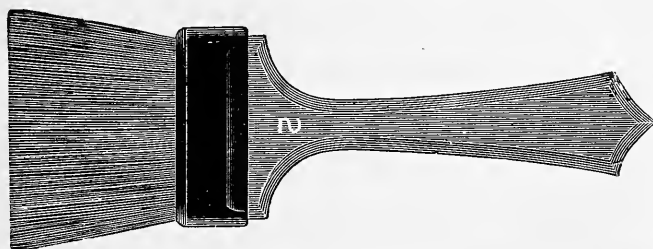


A well made, thoroughly reliable brush, neatly and strongly bound in tin.

PRICES

No. 284.	1 inch wide	\$0.25
No. 285.	1½ inches wide .....	.40
No. 286.	2 inches wide .....	.50
No. 287.	2½ inches wide .....	.60
No. 288.	3 inches wide .....	.80

Hard Rubber Set and Bound Photographers' Brushes



A standard article of well known merit, the bristles being firmly imbedded in the rubber, so that it is impossible for them to drop out.

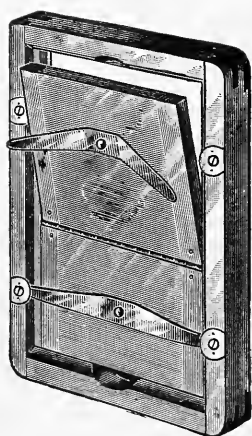
PRICES

Camel's Hair

		Each
No. 289.	1 inch	\$0.38
No. 290.	1½ inches .....	.57
No. 291.	2 inches .....	.75
No. 292.	2½ inches .....	.95
No. 293.	3 inches	1.35
No. 294.	3½ inches	1.90

Bristles, Paste

		Each
No. 295.	1 inch	\$0.20
No. 296.	1½ inches .....	.25
No. 297.	2 inches .....	.35
No. 298.	2½ inches .....	.45
No. 299.	3 inches .....	.50
No. 300.	3½ inches .....	.70



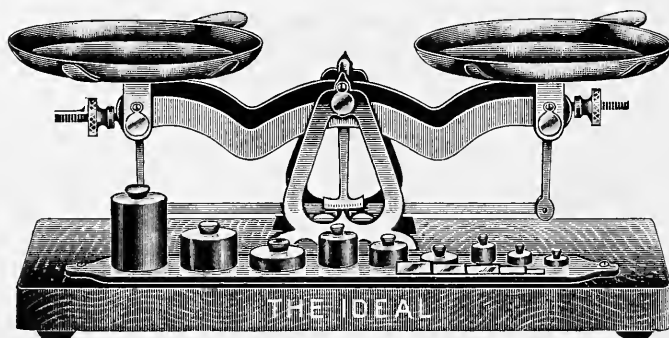
Imperial Frames

These frames are fitted with countersunk piano hinges, which extend along the full width of the pressure board and which add to its strength, appearance and durability. They have extra heavy springs and large finger cut-outs, and are by far the best heavy printing frame on the market.

PRICES

No. 306.	3 1/4 x 4 1/4	\$0.36
No. 307.	4 x 5 .....	.38
No. 308.	4 1/4 x 6 1/2 .....	.42
No. 309.	5 x 7 .....	.50
No. 310.	5 x 8 .....	.52
No. 311.	6 1/2 x 8 1/2 .....	.60
No. 312.	8 x 10 .....	.75
No. 313.	10 x 12	1.25
No. 314.	11 x 14	1.80
No. 315.	14 x 17	2.40
No. 316.	16 x 20	3.00
No. 317.	18 x 22	4.00
No. 318.	20 x 24	5.00

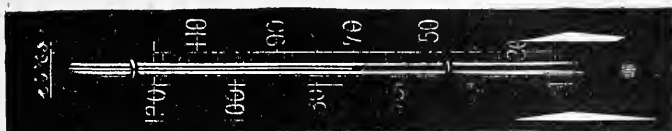
Ideal Balance Scale



All the metal work on the scale, including the weights, is handsomely nickel plated and polished; the base is of quarter-sawed oak, highly polished, making it the prettiest scale on the photographic market.

No. 305. Price, complete with weights from 1/2 grain to 2 ounces....\$3.00

The Ideal Photo Thermometer



This thermometer is made especially for photographic use. It is mounted on a metal plate which has two springs to hold it in the photographic tray, so that the temperature of the bath may be ascertained while prints are being toned. In this way a uniform temperature can be kept in the toning bath.

No. 301. Price, each.....\$0.25

Ingento Thermometer

This thermometer is of the highest grade, equal in sensitiveness to a clinic thermometer. It is very convenient for ready use, as it can be carried in the pocket. It is fitted in a gold-plated case with chain and safety pin attached.

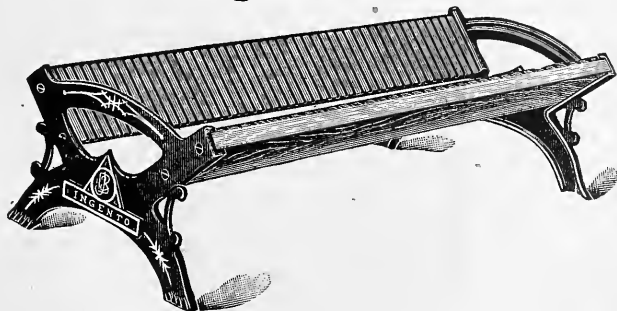
No. 302. Price, each.....\$0.60

Hydrometers

A hydrometer is an absolute necessity if you make up your own solutions, especially of soda mixtures, as different sodas vary greatly in strength. Our hydrometers have especially long tubes, which makes them sensitive to the slightest variation in the specific gravity of the solution under test. Directions for use with each hydrometer.

No. 303. Price, including glass jar.....\$0.50

Negative Rack



This rack is specially designed for professional use. Any size negative can be accommodated, from 14x17 down to lantern slide size. The end framework is of iron, beautifully enameled and gold decorated. The plate rest is of heavy hardwood, with grooves cut uniformly about half an inch apart. The Ingento Negative Rack is very rigid and cannot be tipped over. It is 24 inches long.

No. 304. Price.....\$1.00



X Ray Protective Suit

These suits are made of rubber which contains a solution of lead foil, vulcanized in such a way that the material is pliable and consequently can easily be shaped to any part of the human body. It is easy to wash and sterilize the same in boiling water.

- No. 327. Complete outfit, consisting of an Apron, Hood, Pair of Protective Gloves and Pair of Spectacles..\$30.00
 No. 328. X Ray Protective Apron. 16.50
 No. 329. X Ray Protective Hood.. 8.50

Developing Gloves



Heavy black, sizes 6, 6½, 7, 7½, 8, 8½ and 9.

No. 361. Price, per pair\$1.50

High Frequency Currents



LECTRICAL currents of high frequency and potential have been found very beneficial from a therapeutic standpoint for years, but it is no doubt due to D'Arsonval and his co-workers for the prominence they bear among the medical profession today.

The study of these currents, the mode of application and results obtained from their use, have been taken up in our own country by Piffard, Allen, King, Morton, Snow, Barnum, Grubbe, and others of note, who have freely given their discoveries to the profession, until today almost every coil or static in use has its high frequency attachment, and results have been obtained from its use when other remedial agents have failed.

The term "high frequency," as applied to an electrical current, is that which has been generated from a coil, static machine, or other form of high potential apparatus, and this again "stepped up" through proper condensers and a solenoid to the point where the current is given off in millions of oscillations per second. So rapid are these oscillations that the sensory nerves fail to respond and applications, therefore, are painless.

In the year 1903, Oudin, of Paris, improved the D'Arsonval apparatus by adding to its coarse wire solenoid a spiral of finer wire, leaving the upper end free for a unipolar connection, the result being that the current now bearing his name gives a long, soft, non-irritating effluve very rich in ozone. Less heat is manifested from the glass vacuum electrodes with the Oudin current, which is a decided advantage when high frequency currents are used within the cavities.

As it is with the Oudin resonator that the safest and best results are obtained, and as all high frequency apparatus are modifications of this type, we will give a brief description of its component parts, that the physician may know its mode of construction.

The resonator consists virtually of two parts, the solenoid or coil of wire which forms the drum, and the condensers with spark gaps.

The condensers are large glass jars, with tinfoil placed both inside and outside, closely connected to the jar. The spark gaps are in circuit and connected to the inside coating of the jars. The outside coating of the jars is connected to the large wire of the solenoid. A spiral of finer wire is attached to the coarse wire solenoid which completes the winding of the drum, ending in a terminal so arranged that the current can be conducted from the resonator by means of various attachments.

The condensers are charged from a coil or other source of energy, which enters into the jars, charging one with positive, the other with negative electricity. When the inside coating of the jars are taxed to their fullest capacity they discharge across the spark gap. The source of energy being continually thrown into the jars, cause a constant sparking across the gap, which from necessity is of an oscillatory character.

The outside coating of the jars are charged from induction, and are of the opposite potential to that within the jars. As soon as the current within the jars becomes equal through the discharge across the spark gap, the accumulative charge of the outside coatings are released and, as a consequence must equalize each other through the solenoid, thereby producing high tension currents in the latter. The charging and discharging of the electrical energy across the spark gap terminals within the jars necessitate the great quantities of energy stored in the outside coating to discharge and

immediately re-charge in harmony with the inner coatings, thus it will be seen that oscillatory currents of a very high potential are set up in the solenoid, equal to the self-induction and capacity of the condensers, amounting to millions per second.

There are four different methods for administering treatments with high frequency currents:

The method of D'Arsonval known as auto-conduction.

The method of D'Arsonval known as auto-condensation.

The direct bi-polar method.

The direct Oudin or uni-polar method.

Auto-conduction is given by placing the patient within a large solenoid or spiral, which completely encircles the body, the solenoid being attached to the outer coating of the leyden jars having the spark gap arrangement to the inside coating of the same. In this treatment the resonator is not used, the adjustment being a D'Arsonval apparatus in itself. On account of the cumbersome nature of the apparatus it has not met with favor and is but little used.

Auto-condensation, a very popular and valuable form of treatment, is given by connecting one terminal from the outside coating of the leyden jar of the resonator to the Piffard cushion (shown on page 110) which is placed upon any convenient chair. The other terminal from the outside coating of the corresponding jar, is attached to a split cord, on which is affixed two suitable metal handles. The patient is seated upon the cushion and firmly holds the handles. High frequency treatments given in this manner are without sensation, although from 450 to 800 milliamperes can be passed through the body with ease.

The direct bi-polar method consists of connecting the patient with one terminal of the solenoid and, by means of a suitable electrode connected to the other terminal of the solenoid, make application to any part desired.

The direct Oudin, or uni-polar method, consists of connecting any suitable electrode to the upper terminal of the resonator, allowing the air to act as a conductor for the return of the current to the apparatus.

The auto-condensation and Oudin methods are most popular and suitable for all applications of high frequency currents.

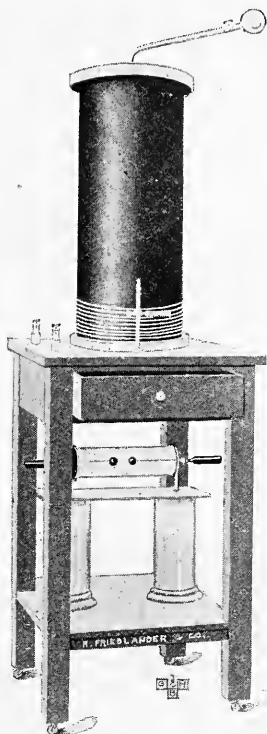
The auto-condensation method is especially recommended for the treatment of gout, chronic rheumatism, pulmonary tuberculosis, anemia and chlorosis, stomach troubles, and various constitutional diseases.

The Oudin method is recommended for local diseases, as eczema, lupus vulgaris and erythematosis, acne, psoriasis, headache, neuralgia, rectal diseases, enlarged prostate, malignant growths, ulcers, impotency, trachoma and diseases of females.

The Oudin current, when used in connection with the high frequency light chair, gives excellent results in hysteria, neurasthenia, insomnia and obesity. This manner of administering high frequency is especially valuable for treating facial disorders. The patient being seated in the chair, receives the tonic effect of the current, while the operator, grasping a surface electrode without handle, is enabled to draw the current from the body at any particular point, thereby greatly facilitating a cure.

With the information herein contained, a physician has a means of guidance at hand, and it is for him to push onward toward success that so many of his colleagues have attained. The field for this class of work is large and offers many possibilities.

The R. F. Improved Resonator



The one essential for successful work with high frequency currents is suitable apparatus, and in this matter we speak the judgment of the best and most renowned operators when we state that our Oudin resonator is superior to either the D'Arsonval or Tesla form of apparatus.

Of all the so-called high frequency resonators, few have the resonance necessary to give the needed potential, for when the proper construction is carried out, the spark gaps, condensers, solenoid, and wiring of the drum are working in perfect harmony and unison, and this is readily accomplished in our resonator, as the manufacture is carried out strictly on scientific principles, in which the capacity of the condensers are controlled in relation to the induction. This is accomplished by a ratchet adjustment, which is so constructed that the contact rotates from one spiral to the next without the operator receiving the discharge from the resonator, while the disadvantage of the spring contact is overcome. The spark gaps are recessed instead of having ball terminals, which overcomes the corroding from nitrous gases and the necessity of cleaning the muffler whenever the resonator is used.

The resonator is connected to the coil by conducting cords similar to those used in connecting the X Ray tube, and in the same manner, from the secondary terminals of coil to two binding posts on the top of the table and back of the solenoid as you face the apparatus.

The spark gap should be gradually opened until the desired current is obtained, and care should be exercised to note that the discharge between the terminals of the spark gap has a white feather appearance, and not a yellow or thick, heavy flame. When this last appearance is noted, the terminals of resonator should be removed and cleaned, or the gap opened wider. It must be remembered that the farther the rheostat is cut out on the coil the wider the spark gap on resonator must be opened and vice versa.

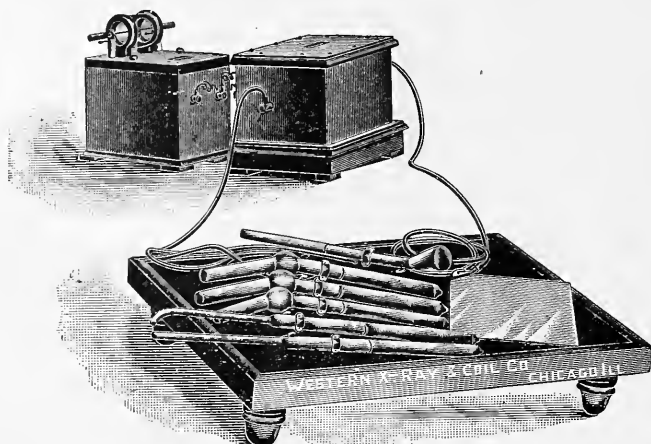
This type of resonator permits of the highest amperage and the effluve is very soft and penetrating, as well as non-irritating.

We manufacture resonators for both the direct and alternating current.

The table, unless specially ordered, is finished in imitation of mahogany, and the jars for the condensers are made of special glass, so that there is little danger from puncture during use.

No. 319. Price, including set of Rice electrodes and cords.....\$60.00

Tesla High Frequency Coil



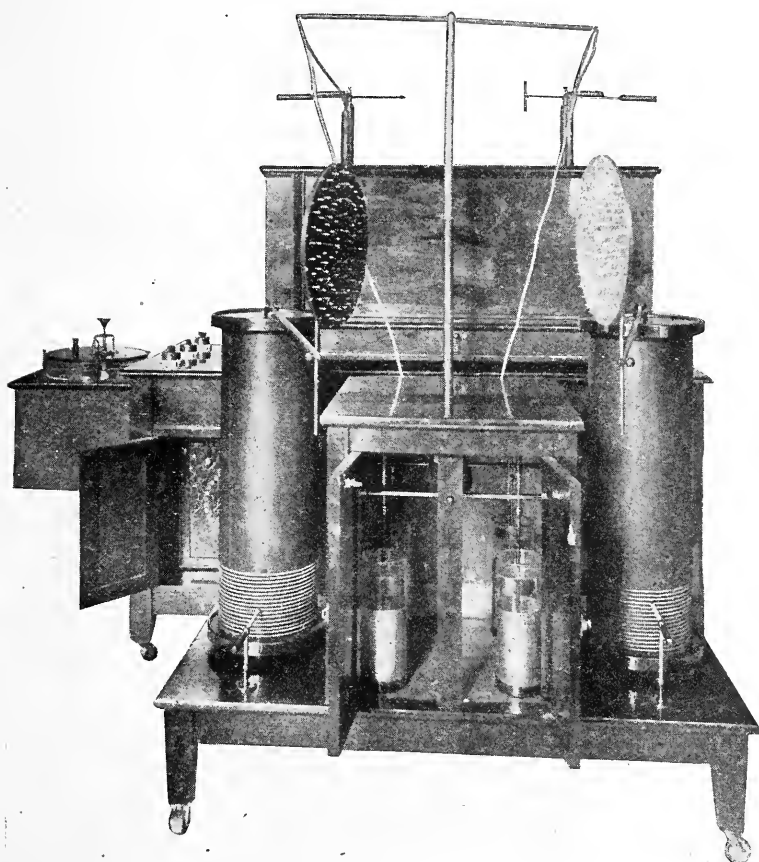
The above illustration is a type of Tesla High Frequency Coil which, instead of having the leyden jars, has a condenser and detonator according to the latest improvements, and it has a spark gap mounted on top of the condenser with sliding rods.

It is designed for use with induction coils.

Any of the illustrated high frequency electrodes may be used with the apparatus.

- | | | |
|----------|---|---------|
| No. 321. | Price for Tesla High Frequency Coil, for use with induction coils | \$35.00 |
| No. 322. | Price, with set of Rice's electrodes | 40.00 |
| No. 323. | Price, with set of Rice's electrodes and platform | 46.00 |

The Double Resonator



To successfully operate the Double Resonator requires a coil of 16 inches spark length or over, as a smaller coil will not excite the resonator to its greatest capacity.

This type of resonator is especially designed for tubercular conditions, as the output of effluve is so great, yet mild and penetrating, that the whole chest and back area can be exposed at once. The patient is seated upon a chair, between the two large multiple spray discs and while receiving the high frequency bath is enabled to inhale copiously of the immense quantities of ozone that are generated with this type of apparatus.

The resonator, if desired, can be used single or double, in accordance with the case undergoing treatment, and we recommend this apparatus as most efficient for lung specialists, hospitals and sanitariums.

No. 320. Price, complete\$125.00

High Frequency Chair and Light Bath



Patented July 19, 1904, No. 765470.

The chair is of oak, beautifully finished. Between each spindle comprising the back, under the arm-rests to the seat and across the supports underneath, sixteen large and especially constructed high frequency tubes are placed, connected in series, which in action are brilliantly lighted, and from which emanate a powerful high frequency discharge. The whole system of the patient is subjected at the same time to the current and they also receive the benefit of the chemical and violet rays of light, which are manifested within the vacuum of the tubes. So nicely has the area of the tubes been calculated that the patient does not experience any pain nor

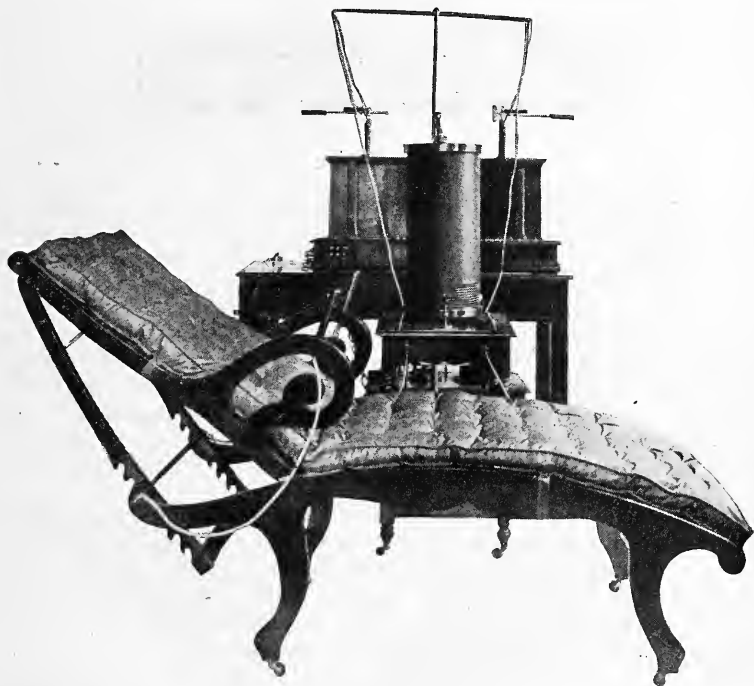
unpleasant sensation while undergoing treatment, yet so abundant is the system charged with the high frequency current that a vacuum tube five feet in length and one and one-half inches in diameter, if held by the patient undergoing treatment, glows with the violet light characteristic in a high frequency tube, and if local application is desired, as for acne, eczema, psoriasis, pulmonary tuberculosis, etc., the operator grasps the surface electrode in the hand and applies it to the desired area, thereby drawing the current from the system at that point.

The chair is so constructed that both Oudin and D'Arsonval currents can be administered, as binding posts on the chair serves as an attachment to any source of high frequency current.

The physician will find this chair a most useful accessory to his electrotherapeutic equipment, as the weakest and most nervous patients find treatment pleasant and beneficial.

No. 324. Price.....\$60.00

Auto-Condensation Couch for High Frequency Apparatus



The Auto-Condensation Couch is another very convenient method of applying high frequency currents to the patient. It consists of a wood framework with cane seat and back-rest, and is adjustable to any angle, so that it can be made into a bed in order to give the body perfect rest.

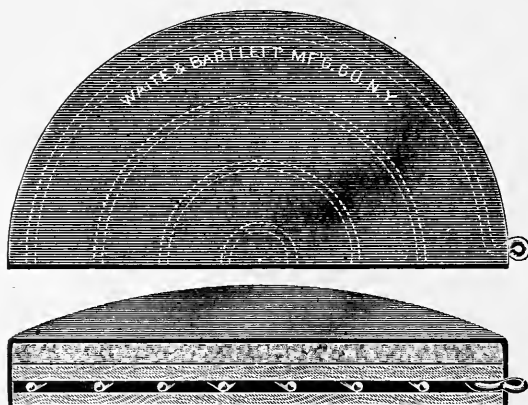
The cushions supplied are of an insulated material, which thoroughly insulates the patient from the current.

No. 325. Auto-Condensation Couch, leather cushions, mahogany-finished woodwork\$100.00

No. 326. Rattan Auto-Condensation Couch 75.00

Dr. Piffard's Cushion Spiral

For D'Arsonval Auto-Condensation Current.



This Cushion Spiral, for use with high frequency currents, has been found convenient and effective, taking the place of the expensive auto-condensation couch of D'Arsonval, as proposed by Dr. Piffard in the "Archives of the Roentgen Ray," October, 1904.

To use the Cushion Spiral for auto-condensation treatment our resonator, which is fully described on a preceding page, or Dr. Piffard's high frequency spiral with jars must be used in connection with a coil, or if a static machine is available, Dr. Piffard's high frequency spiral No. 1, connected to the jars of the static machine as directed under explanation for its use, must be observed, as the D'Arsonval current can be generated in no other way.

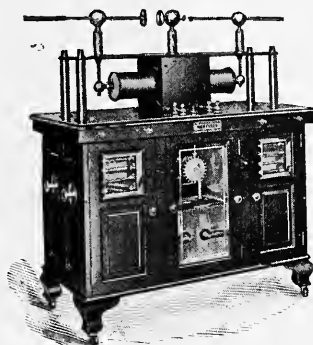
The cushion is then placed upon any chair and connected by a loop on its outer edge to a binding post on table in front of the drum of our resonator, or to central post on spiral, if the latter is used, and the patient is then seated upon the cushion. From the other binding post on table of resonator or spiral a split cord is attached, to which two metal hand electrodes are affixed, and which is held by the patient.

A current from 150 to 900 milliamperes, according to the current strength of apparatus used, thus passes through the system of the patient, without the least sensation, acting upon the cellular structure of the tissue.

Many suggestions for the application of this current will be found under a description of high frequency currents and its use.

No. 330. Price of Cushion and connections, net\$15.00

Dr. Strong's "Hercules" High Frequency Apparatus



An ideal apparatus for administering high frequency currents.

Complete in every particular. Beautiful in appearance, simple in operation, safe, reliable, noiseless, efficient and easily regulated.

It stands in a class by itself.

The thorough system of technique which has been developed for the clinical application of this apparatus enables the operator to produce practically all of the important physiological and therapeutic effects resulting from the medical application of other forms of electrical energy, viz.:

- a. Coarse and fine faradic and cautery currents.
- b. Static spray and spark.
- c. Morton wave current.
- d. Sinusoidal current.
- e. D'Arsonval-auto-conduction and auto-condensation currents.
- f. Effleuve of the Oudin resonator and the bi-polar effleuve of the American high frequency system.
- g. Superimposed wave currents of various frequencies, derived through the use of special electrodes and the air-gap condenser which is an exclusive feature of this apparatus.
- h. Roentgen X Rays.
- i. Ultra-violet rays for Finsen light treatments.
- j. The new multi-frequency currents.

All of these effects are accompanied and supplemented by the wonderful vitalizing and reconstructive action of the particular variety of high frequency oscillations which this apparatus produces.

The cabinets of these machines are of old oak or mahogany, paneled on all sides, with French plate doors in front, behind which the various working parts of the apparatus are mounted in separate velvet-lined compartments. Two banks of fluorescent Geissler tubes are placed one on each side of the central glass panel, for demonstration and experimental purposes. The rotary spark-gap occupies the central compartment behind the glass; this can be shut off by a velvet curtain if desired. The high tension coil, or oscillator, is mounted on the top of the cabinet, and is entirely enclosed in massive hard

rubber; above this, supported by four heavy rubber pillars, is a table of plate glass, which in turn supports the three massive, heavily plated terminals, which are mounted upon pedestals of selected Mexican onyx. The hard rubber knob by which the spark-gap is regulated, is conveniently located in the center and near the front of the top of the cabinet. Connecting posts are provided, by which the high tension coil can be thrown entirely out of the circuit, and the machine can then be used, if desired, to operate any of the European high-frequency apparatus, such as large solenoids, high frequency chairs, condenser couches, resonators, etc.

Each machine is sent out in a specially made packing case, which obviates the necessity of assembling the machines after shipment. The apparatus is, therefore, ready for use as soon as it is taken from the case. Complete directions are sent with each machine.

Price of "Hercules"

No. 331.	For 104-volt alternating current, without accessories, . . .	\$450.00
No. 332.	For 110-volt direct current	500.00
No. 333.	Electrodes, X Ray outfit and Ultra-Violet Lamp (when purchased with the machine)	50.00

Dimensions.—Length, 4 ft.; width, 25 in.; height to top of terminals, 52 in.

Spark Muffler



Can be arranged for Oudin resonator or static machine.

No. 347.	Price, porcelain type	\$6.00
No. 348.	Price, glass type	3.00

The Use of the Static Machine for Electro-Therapeutic Work



IN this age of electricity, when rapid advancement is being made by the "putting to work" of this great force of energy, new devices are daily brought forth and results accomplished that a few years ago would have been thought impossible.

In no branch of science is this more apparent than in the application of electrical currents to combat disease, and the results so far achieved have provoked the wonder and admiration of the medical profession as no other agent has been able to do in the past.

High frequency or high potential currents as generated by coils and resonators, have met with marked success.

The current generated by a static machine, being of the high potential order, differs materially from the so called high frequency current.

The static current is a directional current which, when interrupted, gives results equally valuable and in many conditions superior to the high frequency currents. This is especially true regarding the brush discharge and the Morton wave, two of the most valuable methods of administering static electricity and which cannot be given with any other form of electrical apparatus.

The static current, being a directional one, it is necessary to determine which is the positive and which the negative terminal before beginning work. This is accomplished in various ways. The most simple being to start the machine and after a charge is generated, separate the sliding rods from four to five inches and hold a small wood pointer near the ball terminals of the sliding rods. The positive current will follow the pointer as it is moved to or from the ball. This phenomenon does not occur at the negative terminal. Some machines will not change polarity for months while others change daily, though seldom during the time that the machine is in operation.

A suitable short circuiting rod with an insulated handle should be at hand and long enough to reach across the space between the large brass ball terminals on the front of the machine. This enables the operator to short-circuit the machine more quickly than closing the sliding rods, which cuts off all current from the outside terminals of the static. A static machine should always be short circuited while preparing for the application of any form of static or X Ray treatment.

During the application of static electricity, one side of the machine and the electrode used should be grounded by a chain or wire to some object which eventually reaches the earth. A convenient water pipe from a wash basin is an ideal grounding for the machine and a gas fixture for the electrode. The machine and electrode should never be grounded to the same grounding connection.

In administering static electricity the patient is placed upon the insulated platform and connected to the machine by the shepherd's crook held in the hands or a chain connection to a suitable piece of metal laid upon the platform.

The leyden jars are removed for all applications of static electricity except where special mention is made for their use.

A static machine is available for the production of the X Ray and for administering the following methods of treatment. The Morton Wave and Alternating Potential Currents, the Brush Discharge, Positive or Negative Insulation or Static Bath, High Frequency Currents, Breeze and Spray, the Induced Current and the application of Static Sparks.

X Rays from the Static

Good X Rays can be generated with the static, suitable for fluoroscopic, therapeutic or skiagraphic work. The tube is placed in the stand, held by the long stem or cathode terminal. The anode terminal is connected to the positive and the cathode terminal to the negative side of the static by insulated cords.

The anode of an X Ray tube is that which is in the center of the bulb and receives the bombardment from the cathode or curved disc affixed firmly within the long terminal of the tube.

Application of the Morton Wave

The Morton Wave is considered the most valuable of all static treatments and gives a powerful and local vibratory effect. It induces muscular contraction, increases local metabolism and is excellent for the relief of pain. It is used successfully in cases of anemia, asthma, constipation, dysmenorrhea, gout, insomnia, impotency, lumbago, neuralgia, nervous dyspepsia, prostatitis, acute, chronic or sciatic rheumatism.

A chair is placed upon the insulated platform. On the seat of the chair is placed a suitable (8x10) block tin electrode which is connected to the positive terminal of the static. The patient is then seated on the metal plate so that the bare skin will be in direct contact with the plate. The negative terminal of the static is grounded. The sliding rods, closed at the beginning of the treatment, are gradually drawn apart from two to four inches, depending upon the current output of the static and the effect upon the patient, but a bombardment or sparking must take place between the sliding rods equal to at least four discharges per second. The treatment is painless.

Alternating Potential

The Alternating Potential is identical with the Morton Wave current except that manner of administering is slightly different. The patient is arranged as for the Morton Wave except that the block tin electrode is attached to the stand ball electrode and placed for the arrangement of the spark at varied distances from the positive terminal of the static. The sliding rods of the static are widely separated and the negative terminal of the machine grounded.

Brush Discharge

This very valuable method of administering static electricity is especially useful in relieving local congestion. It promotes local metabolism, relieves pain, swellings, increases secretions and is a rubefacient if carried to excess, and indications for its use are manifested in acute rheumatism, abscess, swelling in fractures, gout, early stages in acute inflammation, lumbago, lupus, sciatica and any congestion or stasis with or without germ life.

The patient is placed upon the insulated platform which is connected to the negative terminal of the static, the positive terminal of the machine being grounded. A fine wire brush electrode attached to the incoming ground and held by the operator near the part of the patient receiving the treatment, being careful to keep the electrode beyond sparking distance.

The effluve is cooling and painless.

The sliding rods of the static should be wide open.

This is a very good adjunct in connection with the Morton Wave treatment as we are then enabled to give both the general as well as local application to troublesome conditions.

Positive or Negative Insulation.

Positive or Negative Insulation is used when a sedative is indicated, as for congested headaches and also in conjunction with other static treatments.

The patient seated upon the insulated platform is connected usually to the positive terminal of the static. The negative terminal being grounded. The sliding rods of the static are wide open.

The above is for positive insulation; for negative insulation reverse connections. Treatment ten minutes.

This treatment, according to Neiswanger, is the first half as used so successfully by him in the treatment of Bright's disease, the second half of his treatment being the application of the negative head breeze for ten minutes.

High Frequency Currents

For the application of high frequency, we recommend in conjunction with the static that a form of resonator be used, although Snow prefers to use the current direct from the machine. In either instance the current is efficient for application to inflamed mucous surfaces and skin affections. Glass vacuum electrodes are used which are attached to the negative terminal of the static, the positive terminal being grounded. The sliding rods are open from one-half ($\frac{1}{2}$) to one (1) inch, depending upon place of application and effect upon the patient.

High frequency currents with methods of treatment are fully described on pages 103 and 104.

Static Breeze and Spray

The Positive Breeze is of a stimulating and the Negative Breeze of a sedative nature. The treatments are similar to those described for the brush discharge, yet more irritating, as treatments are given with a brass point single or multiple electrode. The sliding rods of the static are wide open.

The patient is placed upon the insulated platform and connected to the positive terminal of the static. The negative terminal for the negative head breeze, as used by Neiswanger for the second half of his treatment for Bright's disease the patient is placed upon the insulated platform which is attached to the positive terminal of the static. The crown electrode is placed 15 inches above and over the head of the patient, the crown electrode is connected to the incoming ground.

The negative terminal of the machine being grounded.

The sliding rods of static are wide open. Treatment 10 minutes.

Induced Current

The static induced current is similar to the application of faradic electricity and useful in physiological tetanus. It has a vibratory effect and induces muscular contraction. The current is valuable for the relief of pain and congestion. In the application of the current both leyden jars are used and connected to the static in the usual way. The hand sponges are connected to the terminals of the leyden jars and both applied to the patient in such a manner that the current will pass through the part undergoing treatment.

The patient is not insulated and the sliding rods should not be open more than one thirty-second part (1-32) of an inch.

Static Sparks

The application of static sparks, while possessing curative properties, are but little used on account of the unpleasant sensations produced upon patients. The conditions suggested for their use being in cases of muscular contraction, obstinate cases of rheumatism, and for the relief of deep-seated pain.

The patient is placed upon the insulated platform, which is connected to the positive terminal of the static. The negative terminal of the machine being grounded. A brass ball electrode attached to the incoming ground is used in the hands of the operator, who places the electrode close enough to the patient to allow heavy sparks or the discharge to strike the part undergoing treatment.

The sliding rods of the static are wide open.

The effect of static electricity on the various functions of the system can be summed up as follows, according to Snow:

Action upon the respiratory organs:

Rapid and labored breathing relieved.

Deepened breathing, with increased elimination of CO₂

Action upon the circulatory system:

Lessens arterial tension.

Lessens heart frequency.

Lengthens diastole.

Increases pulse volume.

Effect upon the nervous system:

Relieves irritability.

Induces sleep.

Effect upon the vasa-motor system:

Induces perspiration.

Induces diuresis with elimination of urea.

From the foregoing the physician has an outline of the many uses in which static electricity may be employed and we have but to glance about us to note the success that is being attained by men who have given study to electro-therapy.

The Birtman Static Machine



As long as the practice of electro-therapeutics shall reign, so long will a good static machine be in demand, and the Birtman New Models stand par excellence, in a class by themselves.

The manufacturers have spared no expense to place before the profession a machine as perfect in construction and workmanship as it is possible to make. The woodwork of quarter oak with a piano polish is handsome and of practical design, massive and extremely solid, giving the machine a perfect foundation so that vibration in operation at high speed is not possible.

The shaft is mounted on ball bearings, roller, or graphite box, the latter of which is recommended as it has a firm wood frame rest and requires very little power, is noiseless in action and needs but little attention.

The plates are mounted in sections of eight on heavy brass hubs, clamping each two revolving plates with a large brass washer and lock nut. This insures convenience in assembling or taking the machine apart, as the weight is divided.

A short circuiting device is placed at the right hand end of the machine so that the current can be cut off from the outside terminals of the static in making a change of connections.

The Birtman is constructed with the combined advantages of the friction and induction type of machine, known as the Holtz and Toepler-Holtz, thus giving active surfaces from both sides of the plates. These plates revolve very close to the stationary plates, thereby permitting very little air space; the collecting combs adjusted close reduces the internal resistance, thus permitting of a quick, instant charge.

The glass plates of the Birtman are now supplied with a new coating which is hard like enamel and non-destructible. The plates can be washed in cold or warm water without injury, as this coating cannot crack, scale or peel like the old coating of white or orange shellac that it has been customary to use in the past.

The glass plates are selected free from lead, and are tested to revolve true to operate at high speed.

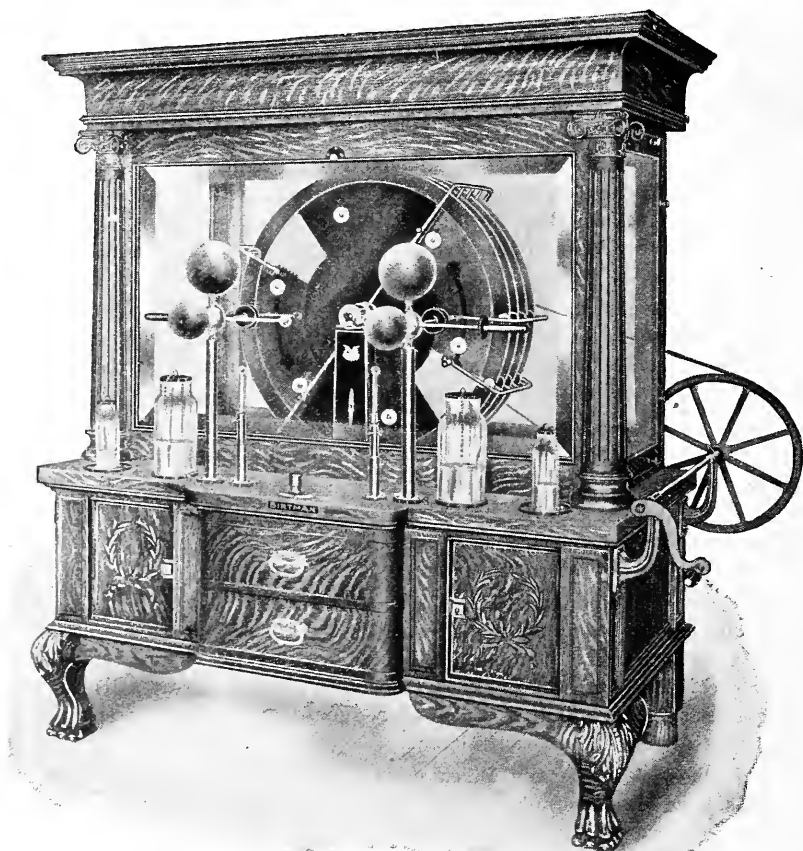
All sharp edges are eliminated, thereby overcoming leakage of generated current and there is absolutely no vibration of the inner mechanism.

The metallic arms are secured and mounted with double ears which are cemented to both sides of the stationary plates, making solid cemented contacts, each metallic arm being joined by means of an individual metallic ear to each stationary plate.

All hard rubber supports are eliminated from the inside of the case. This is a decided advantage, as experience has taught us that hard rubber coming in contact with ozone readily carbonizes, thereby causing frequent cleaning of the apparatus and in time, a complete renewal of these parts.

The Birtman Static is bound to please.

The American Static and X Ray Machine



The above cut is an exact reproduction of the American Static and X Ray machine.

The woodwork is specially selected quarter-sawed oak finished with piano polish.

With its fluted columns, surmounted with appropriate capitals, with curved cornices, swelled front, together with hand carved legs, it certainly presents a very rich and elaborate machine.

Size of Case—5 ft. 4 in. long, 34 in. wide, 6 ft. 4 in. high.

Size of Plates—Revolving 30 in., stationary 33 in.

This machine is so constructed that it can be taken through a 28-in. door.

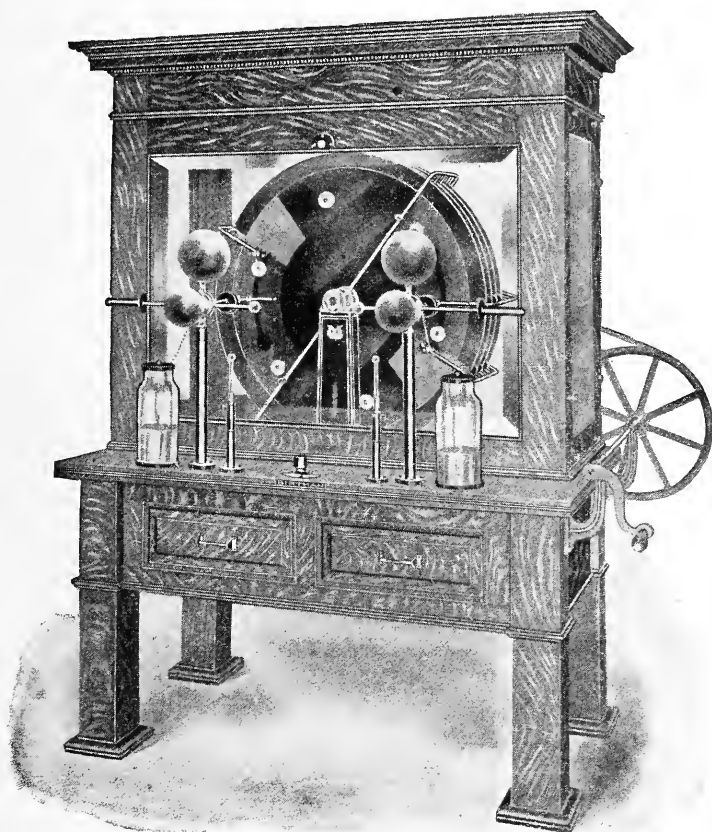
Shipped Set Up Complete

Complete instructions accompany each machine.

For list of accessories included with these machines, see page 120.

No. 334.	Price, 16 plate	\$235.00
No. 335.	Price, 24 plate	265.00

The Navy Static and X Ray Machine



The Navy Static Machine is our old reliable generator which has been so well known among the medical profession for the past twelve years; it is still brought to the front by the addition of our 1906 modifications and improvements, as illustrated in the accompanying photograph, which is a true reproduction.

Size of Case—4 ft. 9 in. long, 31 in. wide, 6 ft. 6 in. high.

Size of Plates—Revolving 30 in., stationary 33 in.

This machine is so constructed that it can be taken through a 28-in. door.

Shipped Set Up Complete

Complete instructions accompany each machine.

For list of accessories included with these machines, see page 120.

No. 336.	Price, 16 plate machine	\$185.00
No. 337.	Price, 24 plate machine	215.00

List of Accessories Furnished with the American and Navy Static Machines



Pair Sponge Electrodes



Metallic Ball



Multiple Spray Electrode



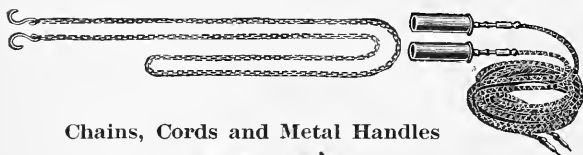
Single Spray Electrode



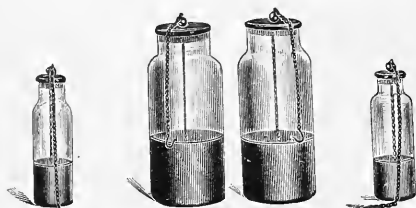
Massage Roller



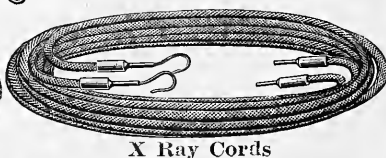
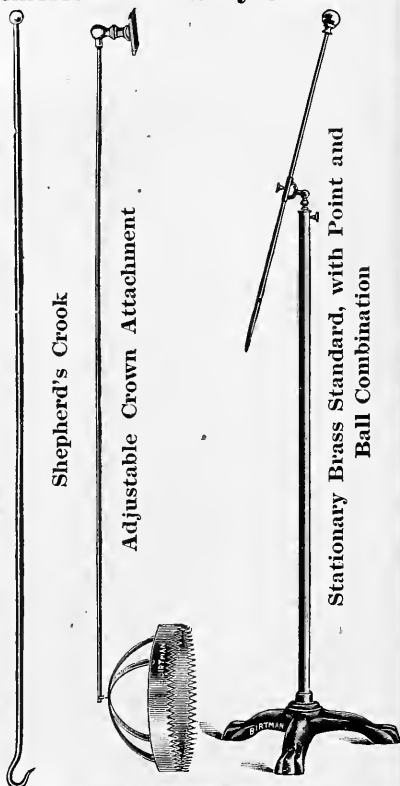
Insulating Hook



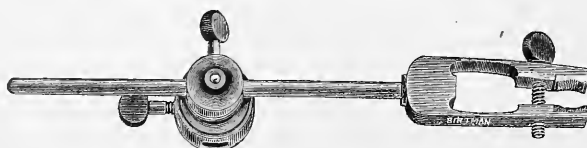
Chains, Cords and Metal Handles



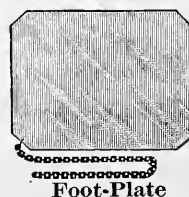
Two Sets of Leyden Jars, Large and Small



X Ray Cords

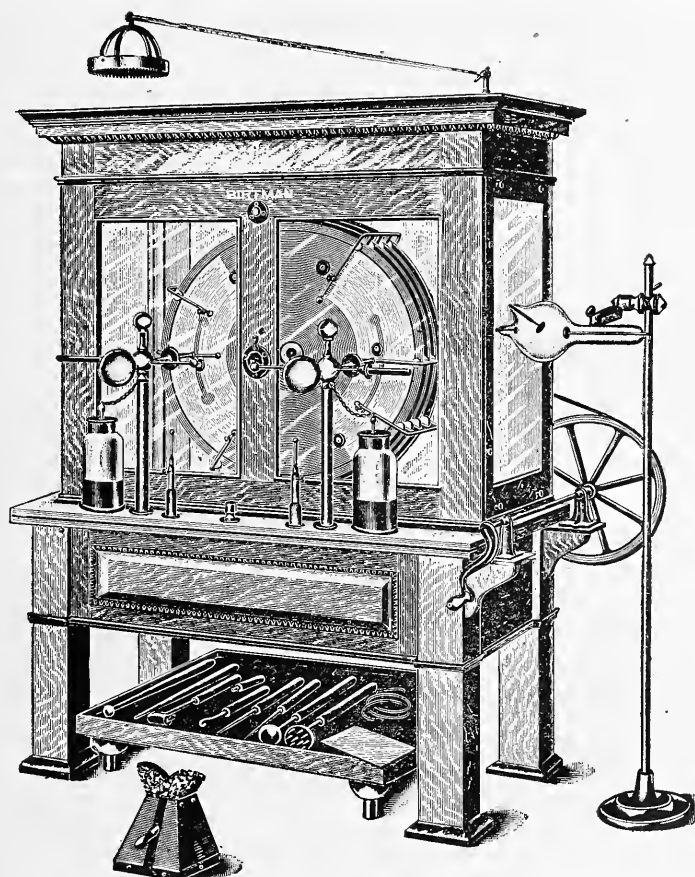
Insulated Platform
with High Glass
Legs

Adjustable Tube Holder



Foot-Plate

The New Reliable Static and X Ray Machine



The New Reliable Static Machine is an exceedingly fine machine for a very low price, a machine that has been long called for by many of the medical profession, who desired a machine to do fairly good work and one that could be obtained at a real good bargain.

This machine, although lighter in construction, will accomplish the work of many other much higher priced machines now on the market.

We include with this machine the following list of accessories:

- | | |
|--|--|
| Stationary brass standard. | One insulating hook electrode. |
| Adjustable crown attachment. | One massage roller electrode and hard rubber handle. |
| Insulated platform, with glass legs and rounded corners. | One metallic ball electrode and hard rubber handle. |
| One set of leyden jars. | One foot plate electrode. |
| One multiple spray electrode and hard rubber handle. | One pair chains, cords and metal handles. |
| One single spray electrode and hard rubber handle. | One pair insulated X Ray cords. |
| One shepherd's crook electrode. | One adjustable tube holder. |

Equipped with High-Geared Hand Power

Shipped Set Up Complete

Complete instructions accompany each machine.

No. 338. Price, 16 plate machine\$125.00

The Nelson Static Machine

The Nelson Static Machine is another type of static machine which is recognized by the medical profession.

The manufacturers are endeavoring their best to give full value for the money, and their continuous endeavors have originated a great many improvements, as for instance the Nelson Movable Neutralizer Frame, the Divided Stationary Plates and the Nelson Combination Pole-Changer.

All their machines are of one quality but are built in various styles of cabinets of more or less elaborate design.

The best kiln dried quarter-sawed oak is used and the finish is dark antique. The polish is second to none. They are furnished either in heavy machine steel shaft on roller ball or phosphor-bronze bearings as desired, either type bearing is guaranteed satisfactory. They are easily removed for cleaning.

The plates are of the standard Nelson quality covered with a waterproof lacquer and perfectly balanced and easily removed, so that the machine can be taken apart and assembled with ease.

Their machines have a set of combs fixed diagonally in a frame which is square and fixed to swing from the shaft. It serves to pick up and neutralize any of the charge which may have been carried past the collecting comb. Its other purpose is to support two of the four wire brushes which help excite the initial charge of the front plate or that which carries the metallic buttons. Tilting the frame in a somewhat horizontal position brings these two brushes in close proximity to the other two situated in the inductor bars. The result is that friction is applied to the buttons just where it is most needed and a quick heavy charge is immediately available in the prime conductors. The frame is then tipped back to as near a perpendicular position as possible, allowing the collector comb to pick up and neutralize the whole charge. This has the advantage that these machines may be charged during atmospheric conditions.

Our divided stationary plates have the advantage of being easily taken apart, taking about only 1/10 of the time that other machines usually need to be reassembled.

Our combination pole-changers are so constructed that they will be useful in not only changing the poles on an X Ray tube, but while the machine is being used with the platform as well.

Our machines have been made so nearly impervious to moisture that a gallon jar of ordinary lake water may stand uncovered within the machine without in the least affecting its generating power. This naturally does not necessitate an artificial drier.

Type "Aristo 1906"



The "Aristo 1906" Machine is our latest and best improved model of any static machine, considering the price.

Size of case, 6 feet 6 inches high and 6 feet 4 inches long. When it is stripped it will pass through any ordinary door.

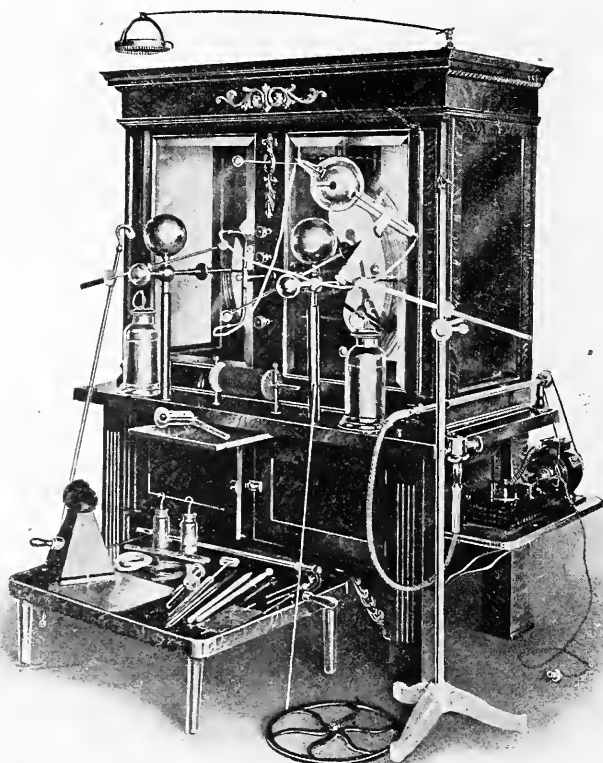
Size of plates: Revolving plates, 30 inches; divided stationary plates, 34 inches.

Our prices include the following elaborate and complete outfit of accessories:

1 large R. F. X Ray Tube, 1 best grade 5x7 in. Fluoroscope with Removable Screen, 1 X Ray Stand and Base, 1 Adjustable Tube Holder, 1 pair X Ray Cords (rubber covered), 1 pair of Electrode Cords (silk covered), 1 Short Circuit Rod, 1 Crown Breeze, 1 Crown Breeze Arm and Support, 1 Shepherd's Crook, 1 Insulated Platform with 10-inch glass legs, 1 set of 6 Rice's Electrodes, 1 pair of Sponge Electrodes, 1 pair of Wood Electrodes, 1 nickel-plated Footplate, 2 sets of Leyden Jars, 1 Flat Block Tin Electrode, 4x8 in., 2 Block Tin Connectors and 10 feet of Grubbe X Ray Foil.

No. 339.	Price, 16-plate machine	\$250.00
No. 340.	Price, 24-plate machine	275.00
No. 341.	Price, 32-plate machine	300.00

"Type A 1906"



Our "Type A 1906" Machine is equal to type "Aristo 1906." To those who are unfamiliar with static machines the above cut will probably seem complicated. It shows how a motor and rheostat may be mounted on a shelf so that a vibrator may be allowed to run by the same motor which runs the static machine.

Cut shows full equipment included in our prices, and as enumerated in "Aristo 1906" machine. The cut also shows the Nelson pole-changer in use in connection with the X Ray tube. A permanent grounding arm, for instantly grounding either side of the machine, is shown at the top of the plate glass. A spark muffler is fixed on the front board of the machine, ready for use at any time by bringing the discharge rods in contact with it. Sliding shelves, adjustable bearings, waterproof plates, etc., are other valuable features of this construction.

Size of case: 75 inches high, 36 inches wide, and when stripped it will pass through any door 26 or more inches wide.

No. 342.	Price, 16-plate machine	\$200.00
No. 343.	Price, 24-plate machine	225.00
No. 344.	Price, 32-plate machine	250.00

The Care of the Static



GOOD static machine will never fail to respond to a charge if it has a few minutes' attention each day from the operator. There are but three causes which will affect its working, viz., dust, nitric acid and dampness. The first is easily removed, as in the majority of instances it is an accumulation upon the outside terminals, plates and case. These should be gone over and wiped carefully every morning, using a soft piece of cloth, which should be used for no other purpose. When the metal parts show tarnish, rub with a soft cloth moistened with kerosene oil and wiped dry. Never use polishing powders, as they remove the lacquer coating which preserves the high finish of the brass terminals, causing the machine soon to present an unsightly appearance.

Most manufacturers of static machines today lacquer the distributing arms, combs and metallic parts within the case, or use aluminum, so that the ozone generated within the case does not affect the metal as was common a few years ago. Thus, danger of short circuiting from this cause is rare. Occasionally the machine should be opened by removing the doors at each end of the case, and the plates and other parts carefully wiped off, removing all particles of dust or deposits of calcium chloride which have lodged upon their surface. A soft piece of cloth fastened upon a narrow stick will allow this to be done between the plates. It is a good idea to allow a current from an electric fan to blow through the machine at this time, the plates revolving very slowly.

If calcium chloride is used as a drying material, place it in suitable containers, covering the same carefully with gauze or similar material which will prevent the minute particles from being set in motion by the revolving plates of the static and eventually find a resting place upon the inner mechanisms of the machine. As soon as the calcium chloride shows traces of deliquescence remove it from the case, bake it thoroughly and return the same.

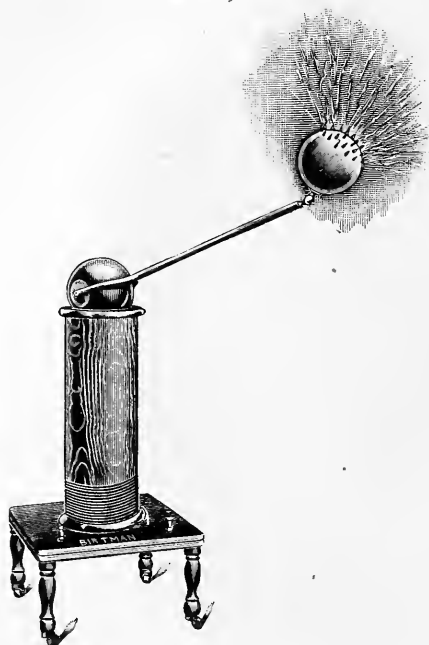
Commercial sulphuric acid is an ideal absorbent for moisture within the case. A suitable container, which will hold seven to eight pounds of acid, leaving ample room for the accumulating moisture, is placed in one end of the machine. A smaller container with four to five pounds of glycerine is placed in the other end. While the sulphuric acid gathers moisture the glycerine absorbs the fumes from the acid, thereby preventing the formation of nitric acid upon the metal parts of the machine.

With some machines that have been in use a long time and badly neglected, the calcium chloride and sulphuric acid may not absorb the moisture within, and for conditions of this character ice and rock salt must be used. Four two-quart Mason fruit jars should be filled with broken ice and salt, using three parts of ice to one part of salt. Screw the caps on tightly. Place the jars on saucers, two in each end of the machine, close the end doors and allow the plates to revolve slowly. The moisture will be seen to condense on the outside of the jars, which should occasionally be removed and wiped off until moisture ceases to condense upon the same.

Do not open the machine during humid weather, but select days when the atmosphere is clear and bright.

The inside mechanism of the machine is simple and readily understood. The revolving plates are tightened by turning up on the outside nut upon the shaft, which is made with a right and left hand screw. The combs are adjusted separately and when the least scraping of these upon the plates is heard give them immediate attention, as this scraping wears away the shellac coating of the plates, which sooner or later would have to be renewed.

High Frequency Apparatus for Static Machine



For use on any large static machine, a chest effleurier, which can be raised or lowered for convenient applications, with each apparatus.

We present herewith a new Combination Oudin-Tesla Transformer, which as the name implies, combines the good points of the Oudin, or single wound resonator with the double coil Tesla principle.

A sixteen-plate static machine (8 revolving), operated at ordinary speed, will so excite this new resonator that an effleuve 12 inches long escapes from the top. This effleuve can in no way be compared to the static machine brush discharge. The latter is painful to the bare skin and is comparatively easy to insulate, while the high frequency effleuve as given off by the Birtman resonator will readily pass through any and all known insulators without any apparent loss in current strength. Plate glass and vulcanite rubber one-half inch thick fails to stop the discharge.

To Operate

Connect the large leyden jars (two pairs in series preferred) to the static machine in the usual way. With the insulated conducting cords, connect from the binding posts of the resonator the binding posts at the base of the leyden jars. Open the sliding rods of the static from one to two inches. The high frequency electrode is connected to the ball terminal on top of the resonator.

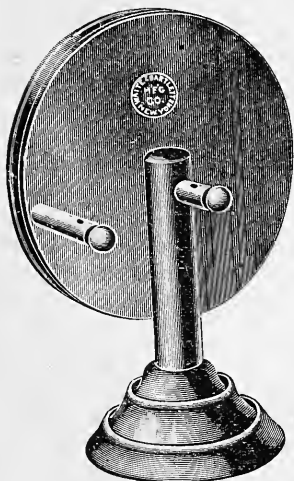
The muffler attachment for sliding rods of static can be used to deaden the noise if desired.

No. 346. Price\$35.00

Dr. Piffard's High Frequency Spiral

For Use with Static Machine in Producing the D'Arsonval Current

No. 1



In using this Spiral in connection with a static machine, medium-sized leyden jars are connected to the static in the usual way and the spiral placed between the jars on the ledge of the static or upon a small table.

Short pieces of insulated wire connect the binding posts at the base of the leyden jars on static to binding posts on front of spiral. The sliding rods of the static are open from one-half ($\frac{1}{2}$) to two (2) inches, depending upon the amount of current the operator is desirous of using, but in all instances a bombardment of current must pass continually between the sliding rods of static. To use the D'Arsonval current for auto-condensation treatment, connect the cushion by its loop to one binding post at base of leyden jar and the split cord with metal hand pieces to the other binding post at base of leyden jar on static, patient being in circuit between the two terminals.

See article by Dr. Piffard in Medical Record of October 28, 1903.

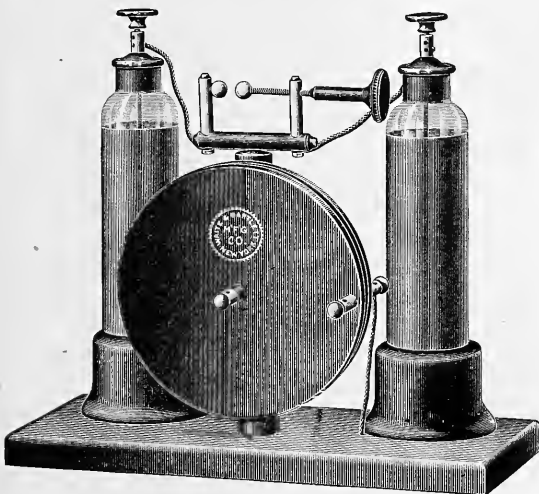
No. 349. Price, net\$15.00

Dr. Piffard's High Frequency Spiral with Jars

For Use on Coils.

This Instrument Produces the D'Arsonval Current

No. 2



In using this spiral with a coil, connect the terminals of the coil with the top of leyden jars where provision has been made for this purpose.

Regulate the spark gap by means of the thumb screw between the jars on the high frequency spiral, but so adjust that the current is continuously passing between these terminals. The amount of current will depend upon the distance between the spark gap terminals. To use the cushion spiral for auto-condensation treatment, connect loop on the cushion to binding post on the front and middle of the spiral and the split cord with the metal hand pieces to the other binding post on the front of the spiral. Patient being in circuit between the two terminals.

See article by Dr. Piffard in Medical Record of October 28, 1903.

No. 350. Price\$20.00

Ultra-Violet Rays

Finsen has demonstrated that the rays of the sun or of the electric arc exert a powerful curative action upon certain skin diseases, notably lupus and epithelioma. Görl, Piffard and others have shown that this effect is produced for the most part by the invisible rays beyond the violet of the spectrum—the so-called “Ultra-Violet Rays.” These consist of transverse ether-waves or vibrations ranging from 750 to 10,000 million-million vibrations per second. They are beyond the range of human vision but have the property of disturbing the atoms in certain unstable chemical compounds such as silver bromide, and some of the highly organized substances which form the tissues of the body.

It is to the ultra-violet rays rather than to the slower light vibrations that the effect known as “sunburn” is largely due. Finsen used the rays from an 80-ampere arc lamp, filtering out 90 per cent of the energy in the form of heat and red light in order to isolate the active violet and ultra-violet rays.

The above article from the pen of Dr. Frederick F. Strong, of Boston, briefly describes ultra-violet light, which today has a decided place in light therapy.

To enable the physician to use this valuable agent we have listed apparatus of various kinds and for various uses.

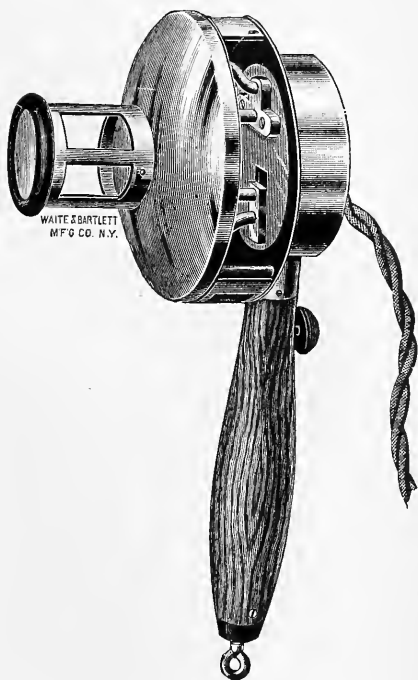
To apply ultra-violet light from the Piffard Ray Lamp and Hand Arc, have the quartz lens in place and apparatus attached to source of energy as directed. Close contact must be made and pressure used to cause hemostasis of the part undergoing treatment. A one per cent. solution of adrenalin chloride greatly facilitates the operation. When the Victor Finsen or Bogue Lamp is employed in skin treatments a piece of quartz must be held against the part treated as above described, but when a general light treatment over a large area of the body is given, the quartz and solution are both dispensed with.

The Piffard Ionizer is to be used for the application of the Piffard Spark Gap Ray, entirely different from ultra-violet light, and found to have wonderful curative action on certain refractory skin diseases. Read carefully the technique giving description of this apparatus.

**Dr. Piffard's Ultra - Violet Ray
Lamp and Ionizer**



**Dr. Piffard's Hand Arc Lamp
for Phototherapy**



No. 351. Price, net\$15.00 No. 352. Price, net 30.00

The Ultra-Violet Ray Lamp is adapted for use on either a static machine or coil, and is of easy management and connection. The output of the ultra-violet rays is very large and are found efficient in the treatment of lupus vulgaris and superficial malignant lesions.

To use, connect a pair of large leyden jars to the static machine in the usual way and connect the outside armature of the jars together and the lamp terminals, by connecting cords to the sliding poles of the static machine which should be separated sufficiently to produce a good spark between the balls, but not more than one inch.

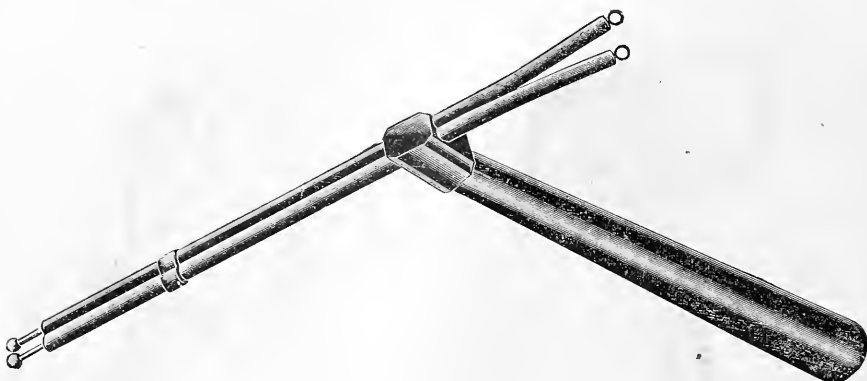
The Hand Arc Lamp has iron terminals and it may be connected directly to any direct 110-volt circuit, a suitable rheostat being placed in series. By the addition of a rectifier this lamp will also work on the alternating circuit.

The entire outfit, including the rheostat, weighs less than eight pounds, and may, therefore, be carried to the clinic or to the house of a patient.

No water cooling process is necessary in this lamp.

Dr. Henry G. Piffard's Spark Ionizer

For Use on Coil or Static Machine



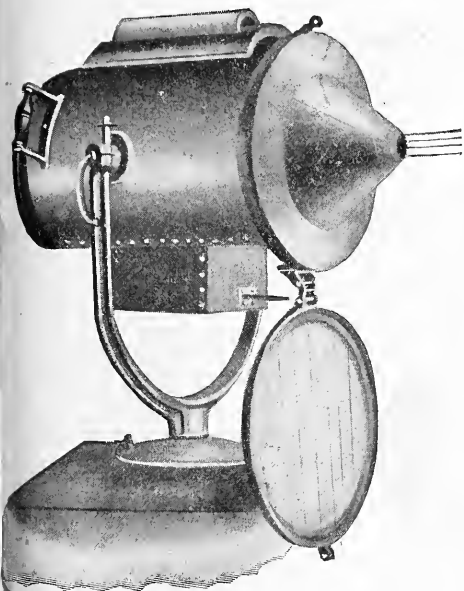
Excerpts from Dr. Piffard's article in the Medical News (New York) of December 3, 1904, entitled, "Second Note Relative to the More Efficient Utilization of the Spark Gap Radiations."

"Since my 'preliminary' note (April 26, 1904) was published I have found clinically that the 'rays,' of which I am speaking, do exert a very powerful influence on the skin; and that the reaction is similar in character to that of the X Rays and of radium; and that it appears much more promptly. Like them also, it may produce a curative or a destructive effect, according to the intensity of the spark and the duration of its application.

"If the lamp be used in connection with a coil and suitable condenser, and an application of about five minutes be made with the sparks, about fifteen mm. from the tissue, a decided reaction will be obtained in soft morbid epithelial and other degenerating lesions. A similar application for fifteen minutes has resulted at my hands in the sloughing out of a lupus nodule. It is important, therefore, that care should be used, especially at the beginning of treatment in any given case.

"As regards the technic, my experience leads me to recommend; (1) If the appliance be used with a coil, a single leyden jar should be employed, with inner armature connected with one of the secondary terminals, and the outer armature with the other terminal of the secondary of the coil. The lamp is then connected directly to the secondary by its cords. I prefer a Wehnelt interrupter adjusted to give a current of five to six amperes through the primary of the coil. The armatures should not exceed 40 square inches of foil each. This for the three-spark lamp. For the one-spark 'Ionizer' a lesser amount of energy is preferable. The first application should never exceed ten minutes. (2) If connected with a static machine use two leyden jars, the armatures of which should each have a foil surface of at least 100 square inches. The outer armatures of the jars should be connected together, and the lamp terminals connected to the pole pieces of the static machine. The first application should not exceed fifteen minutes with the spark from 15 to 20 millimeters from the lesion."

The Bogue Lamp for Phototherapy



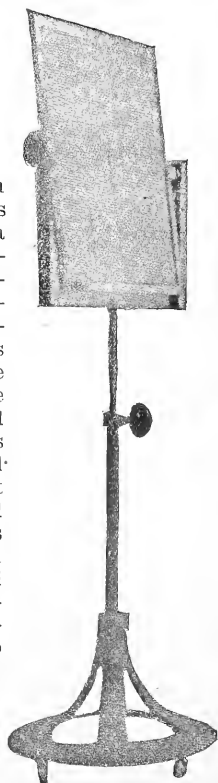
Light as a therapeutic agent, especially the electric arc, is steadily establishing itself in the confidence of the profession. The Finsen light has been discarded by the practitioner as too cumbersome to install and too expensive to operate, but the Bogue lamp overcomes both these objections.

It is run on a consuming current of 25 amperes, but has a rheostat by which 30 amperes can be used, but this is not recommended for prolonged treatment, as the great heat is liable to crack the mirror and injure this part of the apparatus. Carbons are used which are quickly renewed, and to install the apparatus it is simply necessary to connect the incoming electric wires to binding posts on the base of the lamp.

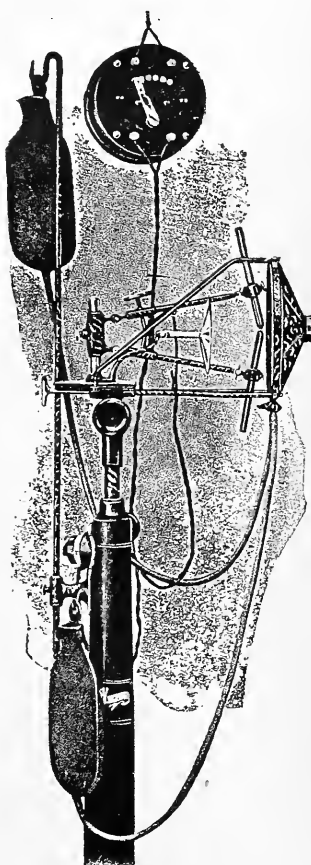
The Bogue Lamp consists of a twelve-inch Mangin mirror projector, in japanned iron, with copper or brass trimmings. The light mechanism is secured through a cast iron base and by a swivel joint the lamp can be rotated in any direction desired, can be elevated or depressed, is automatic in its working and requires no attention. It can be operated on either the direct or alternating current. The greatest energy of the beam of light is secured at a distance not exceeding twelve inches from the end of the funnel-shaped head and at this distance the heat rays are almost entirely eliminated. The thermal and luminous rays are filtered out by placing the blue glass screen between the patient and the light. For a general application, where large areas are involved, as the chest in pulmonary tuberculosis, the arc should be adjusted on the short focus, with the crater of the arc $5\frac{1}{2}$ inches from the concavity of the mirror. This light has been found especially useful in tuberculosis, acute bronchial cold, dry and painful cough, lupus vulgaris and erythematosis, eczema and the nodules of recurrent carcinomas, and when applied to mucous membranes no sensation of heat is experienced.

Application of the Bogue Light is made from 15 to 45 minutes in length.

No. 355. Price of Lamp for either direct or alternating current\$225.00



Victor Finsen Lamp



- No. 356. Price for use on 110-volt, direct, or 104-volt to 120-volt
alternating, as shown in the cut, complete\$100.00
- No. 357. Price for use on 220-volt, direct current 115.00
- No. 358. Price for use on 500-volt, direct current 125.00

Galvanism



PERHAPS no field of electricity that promises so many excellent results and one that has been so little used of late, is that of Galvanism.

The discovery of the electric currents originated with Galvani, a physician of Bologna, in 1786.

He was led to this discovery by observing the twitching of frogs' legs hanging by metallic hooks against copper plates. Galvani imagined the action due to electricity generated by the frogs' legs, but Professor Volta, of the University of Pavia, proved this to be an error by showing that the electricity was caused by the contact of dissimilar metals.

This source of electrical energy is, therefore, generated in a cell, the most simple being that known as the Voltaic cell.

It is constructed by placing water, slightly acidulated, in a suitable glass jar and immersing two clean strips of metal, one zinc, the other copper.

This cell is capable of supplying a continuous flow of electricity through wires, the ends of which are brought in contact with the metallic parts. As the current flows, the zinc gradually melts away and its consumption is the energy that drives the current through the cell and connecting wires. Electrolysis here takes place. The zinc by dissolving throws a current to the copper, the copper also undergoing a change, yet more slowly than the zinc, throws a current toward the zinc. The great difference of potential of the two metals causes the current to flow more rapidly from the zinc to the copper and if these be connected above the solution the current rushes from the zinc, through the solution, to the copper and returns from the copper by means of the connecting wires to the zinc. The copper strip, from which the current starts on its course, is the positive element, designated $+$, the zinc strip being known as the negative element and designated $-$.

The Laclanche cell, being most common, as it is used for working electric bells, etc., is similar to the cell just described except that a solution of sal ammoniac is used with zinc and carbon as the generating elements. The zinc dissolving forms a chloride of zinc and ammonia, while ammonia gas and hydrogen are given off at the carbon pole.

The greater the difference of potential between the metals used in the cell, the greater will be the output of electrical energy.

In our daily conversation regarding electrical apparatus, we hear the expressions, volt, ampere, resistance, and that we may have a clear understanding of these terms we will briefly describe what is meant.

A volt is the unit of electro-motive force (E. M. F.) or the pressure behind the flow of current.

The ampere is the rate of flow, or the current of electricity.

The ohm is the unit of resistance or conductivity over which current passes.

It will, therefore, be noted that it requires the push power of one volt to send one ampere of current over one ohm of resistance, which is equal to a copper wire 250 feet long and 1-20 of an inch in diameter.

In using galvanism in electro-therapeutic work, the skin offers great resistance to the passing of the current and it is therefore necessary to use a sufficient voltage to overcome this resistance. This must be accomplished in such a manner as to keep the ampereage down, as in treatments with galvanism measurement is made in milleamperes (1-1,000 part of an ampere).

This is accomplished by connecting several cells in series, that is, connecting the dissimilar metals, one with another, and it has been found that forty cells as above described are sufficient for the work. A suitable rheostat must be interposed in the circuit so that a greater or less amount of current can be utilized. A milleampere meter must be used to permit of a definite dosage for the amount of current used will range from one-half to forty milleamperes in accordance to the part undergoing treatment.

Particular care must be given to polarity of this current and the characteristic of each terminal fully understood before attempting to use it, as otherwise results diametrical to those expected might result.

The positive pole is acid in its action. It will therefore stop bleeding, is cold, will allay pain and its action on tissue is hardening and contracting.

The negative pole is alkaline in its action. It will produce bleeding, is a current of heat, gives pain and its action on tissue is softening and expanding. It will therefore be noted that for cases of stricture, contractions and the destroying of tissue the negative pole suggests itself, and for tender, bleeding, painful, over strained by increased pressure of blood, the positive pole manifests itself.

A simple way to determine which is positive or negative of the terminals is to drop both into a glass of water and note the action there produced. Hydrogen bubbles will appear in numbers at the negative pole. If both terminals be placed in contact with a piece of moistened litmus paper, the spot under the positive pole will turn red.

In applying treatment with galvanism never use more current than can be pleasantly borne by the patient. The active electrode should be applied to the seat of the disease, the passive terminal, usually a large pad, should be placed as near the active terminal as possible. In treatment of rectal, urethral, uterine or vaginal conditions the large pad should be placed upon the abdomen. For the removal of superfluous hair, moles on the face, etc., the passive electrode is best applied to the nap of the neck. It is a safe rule to use from 5 to 10 milleamperes of current within the cavities of the body and for epilation from $\frac{1}{2}$ to 1 milleampere.

The passive electrode, or pad, irrespective of where it is applied should be moistened with water and if salt is added it will be found to have greatly assisted in overcoming the natural resistance of the body.

In the treatment of stricture of the male urethra, Dr. Neiswanger recommends that a suitable sound just a little larger than the diameter of the stricture be introduced attached to the negative terminal of the battery or wall plate, the positive terminal connected to the large body pad and placed upon the abdomen. His treatment consists in using five milleamperes of current for five minutes, every five days for five treatments. It will usually be noted that at the end of the time as specified that the sound will pass through the stricture. Never force the sound through the stricture but allow it to pass by its weight and from the action of the current upon the surrounding tissue. Use a little larger sound at each operation, providing, of course, that the one used before has accomplished its purpose. Excellent results are also obtained in treating stricture of the esophagus, hemorrhoids, fissure, fistulae, varicocele, gleet, infantile uterus, catarrh of the uterus, dysmenorrhea, amenorrhea, mammary abscesses, etc., also for the removal of warts, moles, naevus, superfluous hair, etc.

Suitable wall plates can be had for using the direct current as supplied by the lighting companies instead of cells if it is so desired.

Directions for Operating the Combined Galvanic and Faradic Batteries

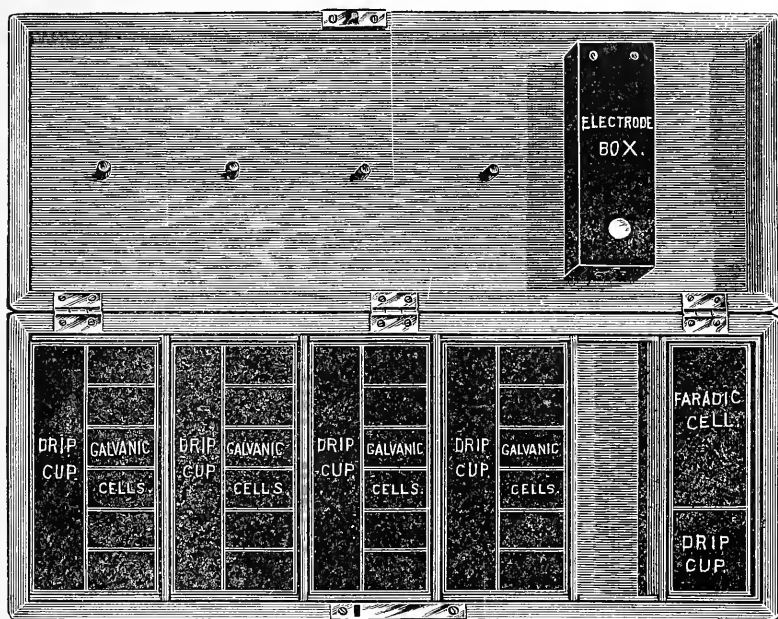


Fig. 1

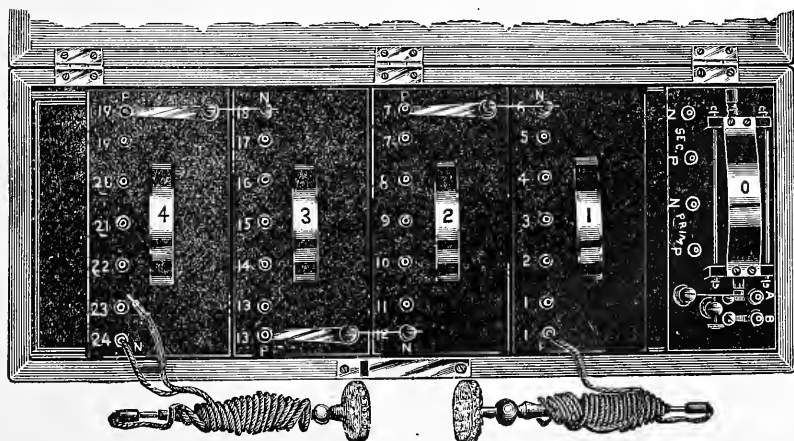


Fig. 2

Read These Directions Carefully

Before attempting to charge and use a battery, please read these directions carefully and notice, by the aid of this diagram and your battery, just how to *make the fluid, fill the cells, connect and work*, as parties after purchasing a battery sometimes write us asking questions which these directions would answer. We do not make this request to save ourselves trouble, for we are always pleased to answer any questions in regard to our batteries, but to save time and much perplexity to the owner.

To make the battery fluid: R—Sulphuric acid (commercial), 3 fluid oz.; powdered bichromate of soda, 3 oz.; water, 16 fluid oz.; bisulphate of mercury, 2 drachms. Dissolve the bisulphate of mercury in the water; then add the bichromate of soda. Slowly pour in the sulphuric acid and stir until the ingredients are dissolved, then allow the liquid to cool, as the mingling of the acid and water produces heat, and if the mixture is used when warm it injures the battery.

The bisulphate of mercury keeps the zincs well amalgamated.

To fill the galvanic cells, remove the sections with the aid of the spring handles marked 1, 2, 3, 4; fill each cell a little more than half full (or to fill equally use the small glass measure accompanying the battery).

Fig. 1 shows the combined galvanic and faradic cells in correct position. After filling or cleaning the cells they should always be placed as shown in this cut.

Fig. 2 shows the galvanic sections of 24 cells connected for use. Each section is marked respectively on the spring handles 1, 2, 3, 4.

To use six galvanic cells, lift Section 1 and remove the elements from the drip-cup; carry forward and place them in the galvanic cells; then connect one conducting cord with P 1 and the other with N 6 (all parts marked P are positive and N negative).

To use 12 cells, lift Section 2 from the drip-cup, move it forward near Section 1, and place the elements in the galvanic cells; connect N 6 with P 7 by means of the horizontal bar and the conducting cords, one with P 1 and the other with N 12.

To connect 18 cells, lift Section 3 from the drip-cup, carry forward and place the elements in the galvanic cells, then connect N—12 with P—13, and the conducting cords, one with P—1, the other with N—18.

To connect 24 cells, lift Section 4 from the drip-cup and place the elements in the galvanic cells, then connect N—18 with P—19 by means of the horizontal bar and the conducting cords, one with P—1, the other with N—24.

To use a less number of cells, remove the cord from N—24, and place it in a post opposite the number to be used.

From O to Section 2 shows a 12-cell Combined Battery.

From O to Section 3 shows an 18-cell Combined Battery.

From O to Section 4 shows a 24-cell Combined Battery.

How to detect the galvanic current: Put one sponge, well wet, in the palm of the hand, and let the other be held between the thumb and the first finger of the same hand. A slight pricking sensation will be experienced. Those only accustomed to the induced or faradic current will be disappointed to find the galvanic current causes only a slight pricking or burning sensation, or perhaps a slight dizziness when applied to the head. A galvanic current that can scarcely be felt in the hand may be too strong to apply to the head or neck.

The bifurcated or forked cord is for the purpose of preventing a shock while changing to a less or greater number of cells while using the galvanic current. For example: Suppose you are using seven cells. One of the bifurcated ends would be connected with cell No. 7, and the other end hanging loose. If you wish to use, say twelve cells, take up the loose end of the bifurcated cord and connect it with No. 12 and pull the other end out from No. 7. Thus all shock is avoided in the change.

To use the faradic section of the battery holding the coil, lift the section marked O from the cell and drip-cup, fill the large cell half full of battery fluid, reverse the section and place the elements in the large cell C and the

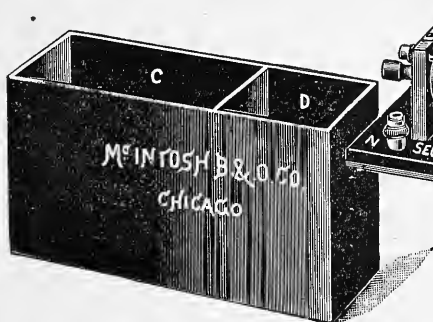


Fig. 3

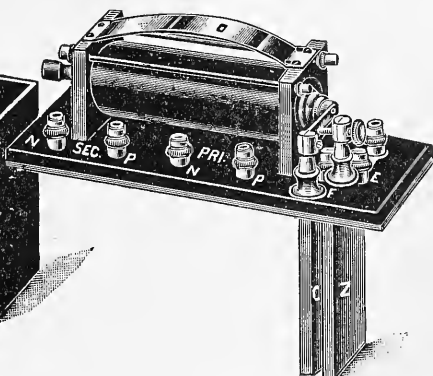
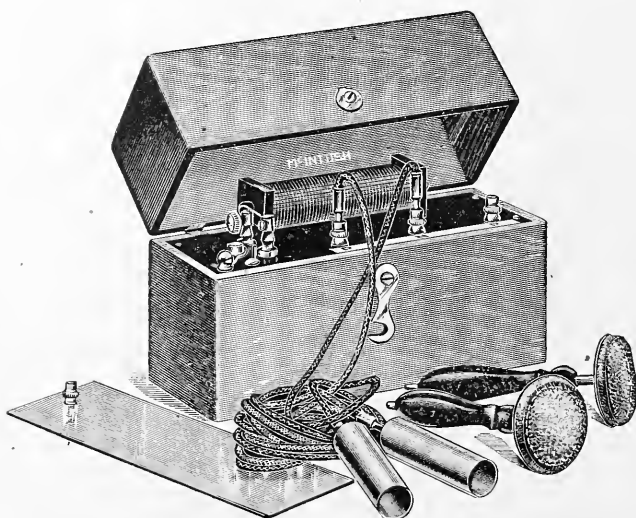


Fig. 4

battery will commence to work at once, which may be known by the buzzing of the rheotome. To obtain the primary current, insert the tips of the conducting cord in posts P and N, on either side of "prim." To obtain the secondary current, insert the cord tips in posts N and P on either side of "Sec." Either current can be made stronger by drawing out the shield in the coil.

To connect the coil with one or more galvanic cells: In a case of emergency, like an attempt to resuscitate a person from drowning, where greater intensity is needed than one cell will give, the coil can be connected with the galvanic cells of Section 1 by means of the long, spiral wires, as follows: Reverse the coil section, immerse the elements of Section 1 and connect Post A near the coil with Post P 1 on Section 1, and Post B on coil with Post 2, 3, 4, 5 or 6, on Section 1.

The Domestic Battery



We illustrate above a very neat and altogether new design in a Dry Cell Faradic Battery, especially adapted to home use; it will be found very popular with physicians who wish to provide patients with a suitable battery inasmuch as it has been devised to meet these especial requirements.

The coil is of an elongated form and is of very substantial construction and quite pretty design. It has both primary and secondary windings, from which may be obtained either primary, secondary or combined primary and secondary currents; all of which may be graduated from low potential to full intensity by withdrawing the sliding shield; the polarity being indicated on the metal name plate just in front of the binding posts; and the rate of vibration being adjusted by turning the milled thumb-screw which is in contact with the vibrator spring.

The switch used to start the coil is so placed that the box cannot be closed until turned off; nor can it be accidentally turned on by a sudden jar in transit, a precaution which prevents the cell from being run down unawares.

The case is of oak, finished in a light golden color, measuring $8\frac{3}{4} \times 6\frac{1}{4} \times 3\frac{1}{4}$ inches, and a compartment for electrodes is provided in the lid; the foot plate forming a cover for this section.

The cell used is the No. 6 Columbia, and especial attention is called to the fact that as the standard size of cell is used it is a very easy matter to obtain renewals in any city or town, or, in fact, in the most remote hamlet. With ordinary use in domestic application the cell should last for about six months.

The following outfit of accessories is provided with the battery:

- One Pair Conducting Cords with Adjustable Tips.
- One Pair No. 1 Universal Wooden Handles.
- One Pair Spongio Covered Disc Electrodes.
- One Pair Nickel-Plated Tubular Metal Handles.
- One Nickel-Plated Metal Foot Plate.
- One Pamphlet of Instructions.

No. 368.	Price	\$5.00
No. 369.	Price of No. 6 Columbia Dry Cell, for renewal.....	.25
No. 370.	Price of No. 6 Columbia Dry Cell, if sent by mail, postpaid .....	.60

Electrolysis Battery

A Convenient Portable Battery for Use in Removal of Superfluous Hair and Other Facial Blemishes



The three features which are considered by most dermatologists in the selection of a battery and outfit for this class of work are, in their respective importance: Reliability, simplicity and portability.

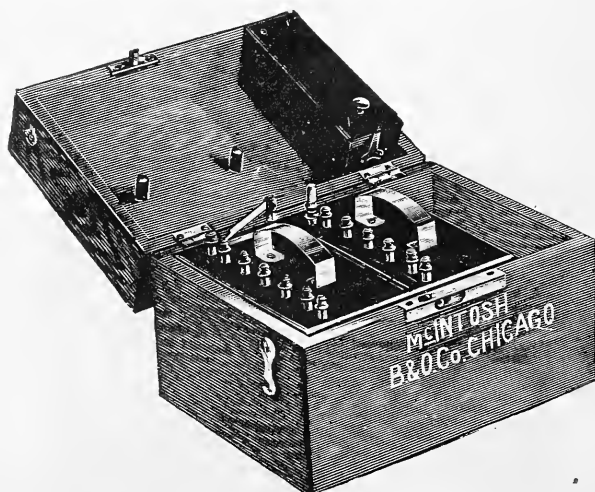
In designing the battery shown in the accompanying illustration, all of these points have received due consideration. It is fitted with six Columbia No. 4 dry cells—cells which we have found to be the most reliable. With ordinary use, and proper care, they should last for from six months to a year. The battery is put up in a handsome morocco case with a neat leather handle. A compartment is provided within the case for all necessary electrodes, cords, etc.

The Complete Outfit Includes the Following Accessories

1 Pair Conducting Cords; 1 Needle Holder; 4 Hayes' Needles; 2 Steel Needles; 2 Iridio-Platinum Needles; 1 Pair Forceps; 1 Magnifying Glass; 1 Hand Spongio Electrode; 1 Pair Handles and Spongio Discs; 1 Copy Hayes' "Electricity in Facial Blemishes."

No. 371. Price of battery and complete outfit\$10.50

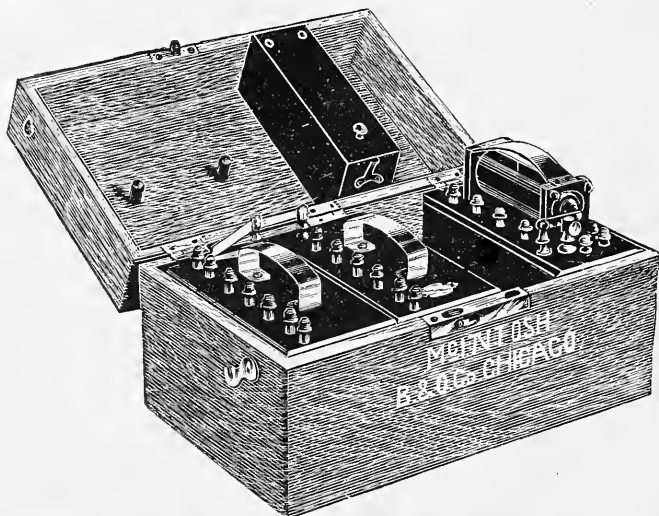
When cells are exhausted, send us \$1.25 and six new cells will be furnished, or if battery is sent to us prepaid, we renew the cells at a uniform charge of \$1.75 net.



Twelve-Cell Galvanic Battery

In a polished black-walnut case, $10\frac{1}{2}$ inches long, $8\frac{1}{4}$ inches wide, $7\frac{1}{4}$ inches high, metal work all nickel-plated, lock and handle sponge electrodes, cable conducting cords and aluminum electrode box. This is a very convenient visiting battery, as it weighs only eleven pounds, and gives a galvanic current of sufficient intensity to treat any case where a mild current is indicated.

No. 359. Price \$15.00



Twelve-Cell Combined Galvanic and Faradic Battery

Same style of case and finish as the above, $13\frac{1}{2}$ inches long, $8\frac{1}{4}$ inches wide, $7\frac{1}{4}$ inches high, with first-class faradic coil, polished hard-rubber ends and cover, extra large cell to run the coil, electrodes, our new cable conducting cords and aluminum electrode box. This battery gives a galvanic current same as above described, and a faradic current of sufficient strength to treat any case.

No. 360. Price \$20.00

Fourteen Dry Cell Combined Galvanic and Faradic Battery



This most desirable physicians' galvanic and faradic battery is provided with fourteen No. 4 Columbia dry cells; twelve in the galvanic portion and two connected to the coil.

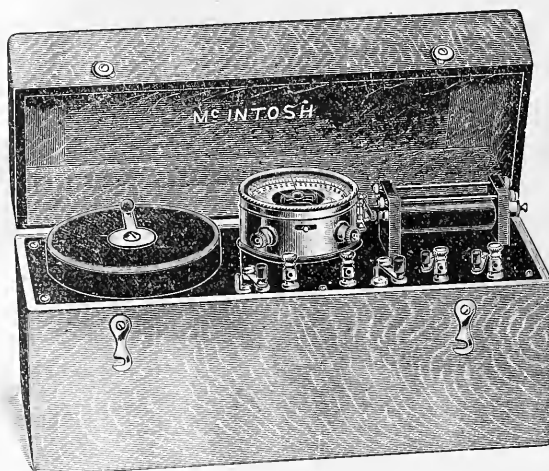
The galvanic cells are connected to a cell selector switch which affords control of the current. An interrupting key is provided; this is especially valuable in diagnosis. The galvanic current is of sufficient strength to treat any case where a mild current is indicated; it furnishes ample current for the removal of superfluous hair and all blemishes, such as moles, warts, naevi, etc. The galvanic current may also be used for lighting diagnostic lamps. The galvanic and faradic currents can be combined if desirable.

The faradic coil gives a perfectly regulated faradic current of variable intensity. An "on" and "off" switch places the coil in action. Another switch permits of the selection of either primary or secondary current. The cells of this battery should last six months or a year. They are connected in a very simple manner, so that it is the work of but a few moments to replace them when necessary. The battery is put up in a plush-lined, morocco covered case, which is fitted with a leather handle. A large compartment for conducting cords, electrodes, etc., is provided in the lid.

No. 362.	Price, including Conducting Cords, Handles and Spongio Discs	\$15.00
No. 365.	Price of twelve new Cells for galvanic portion	2.40
No. 366.	Price of two new Cells for faradic portion .....	.40
No. 367.	If battery is sent to us express prepaid we recharge it at ..	3.25

"Elaborate"

Twenty-seven Dry Cell Galvanic and Faradic Battery



The illustration shows a battery in which the galvanic current is obtained from twenty-five No. 4 Columbia dry cells connected in series, controlled by one MacLagan wire rheostat and measured by the improved milliamperemeter, scale reading 0-150, and obtained from the binding posts facing the meter. An "on" and "off" switch permits of the meter being removed from the circuit when it is desirable to light diagnostic lamps of large capacity.

The faradic coil is being operated by two cells; the current obtained therefrom is brought to a separate set of binding posts.

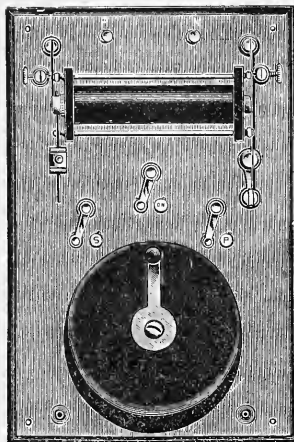
The greatly simplified system of wiring arrived at by connecting the galvanic and faradic circuits independently, adds greatly to the immunity from short circuit to the cells, and also permits of the galvanic and faradic currents being combined in a very simple and convenient manner.

This battery affords a galvanic current of great adaptability, a primary faradic current, a secondary faradic current, a galvano-faradic current, and a current to light diagnostic lamps.

The outfit is finished in a general style and is put up in a weathered oak case.

No. 372. Price, including Conducting Cords, Universal Handles and Spongio Discs\$32.50

Faradic Bath Tub Switchboard



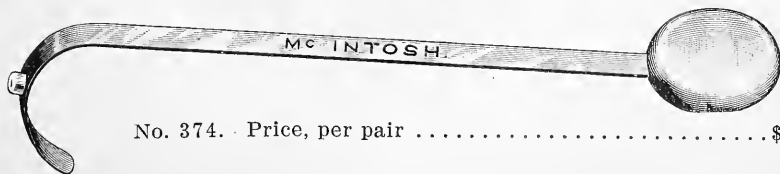
The above cut shows our new bath tub switchboard. The base is a plate of highly polished marble, $9\frac{1}{2} \times 16$ inches, upon which is mounted a faradic coil provided with two vibrators, one for giving coarse vibrations for the purpose of massage; the other a ribbon vibrator, or so-called "Singing Rheotome," which gives high rate of vibration and is especially adapted for producing local anesthesia; MacLagan wire rheostat, with all necessary switches for selecting primary and secondary faradic currents, together with the necessary binding posts to connect with the supply current and with the patient's circuit. The secondary winding consists of 1,300 feet of No. 30 wire, wound in 3,500 turns. The primary consists of 230 feet of No. 20 wire, wound in 860 turns. The coil may be excited with three National No. 7 cells, or can be operated in series with a 16 C. P. 110-volt lamp on direct current lighting circuit. When the latter is used we can furnish connecting cords

and an attaching plug or tap, which may be screwed into any lamp socket. The quality or strength of the current in either the primary or secondary is perfectly controlled by the wire rheostat, thus giving the operator absolute command and regulation of the widest range of therapeutic application. The slowly pulsating current from the weighted vibrator is especially beneficial in bath treatment.

The greater range of adaptability of this faradic apparatus in either electric bath or electric massage treatments, and its perfect adaptability for every possible demand for faradism in either the home, the bath parlor, or the sanitarium, has brought this switchboard into universal favor. It may be used in any bath room in connection with any porcelain or porcelain lined iron tub, the movable bath tub electrodes being placed in any desired position on opposite sides or ends of the tub, thus permitting application of the current to any portion of the body of the patient.

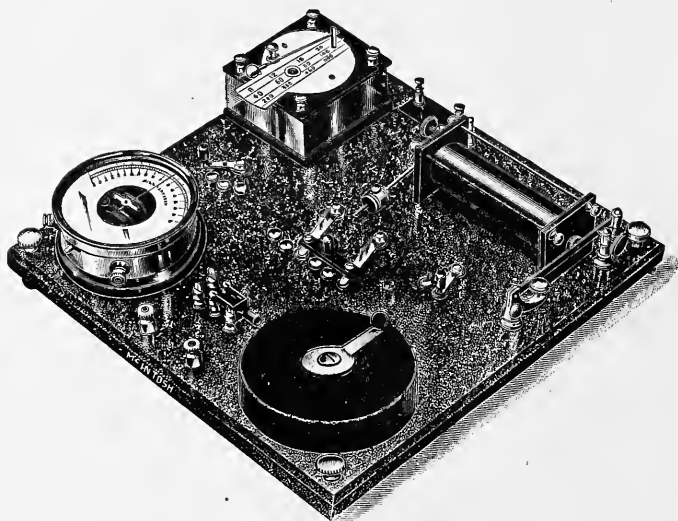
No. 373. Price, as shown above, including handles, sponge discs and conducting cords	\$16.00
Price three Columbia No. 6 Dry Cells—to operate the coil .....	.75
Price Vetter Series Tap and six feet of lamp cord for use when the 110-volt direct dynamo current is available	1.25
Price two Movable Bath Tub Electrodes	2.50
Price pair of waterproof Bath Cords	1.50

Movable Bath Tub Electrode



No. 374. Price, per pair\$2.50

Table or Wall Plate



The illustration shows our table or wall plate in an unmounted form, arranged to be affixed to the wall, or to be placed upon a table.

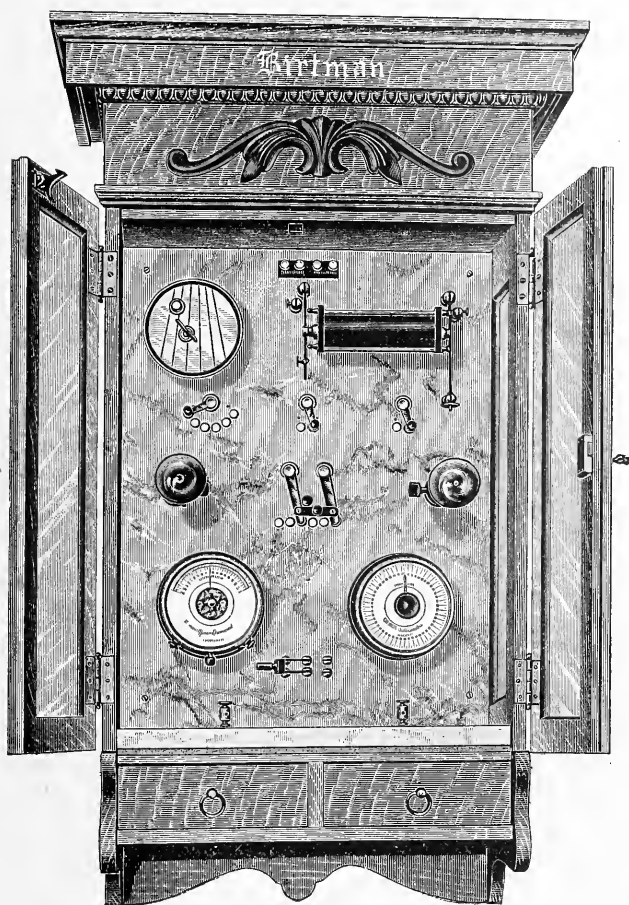
Tennessee (brown) marble is the stone generally used as a base for the plate; unless otherwise specified, therefore, it will be furnished in Tennessee marble.

Italian (white) marble makes a very handsome mounting for this switch board; if request is made, we will furnish the plate in this color.

This switchboard when used with the 110-volt direct dynamo current, must be connected with a lamp in series; therefore, with the plate only we recommend the use of the Vetter tap.

No. 375.	Price	\$32.50
No. 376.	Price of Vetter Current Tap with connecting cord.....	1.25

Wall Cabinet No. 4



This very practical and up-to-date Electro-Therapeutical Wall Cabinet is arranged to obtain all of the currents desired for treatment in a general practice. It is the "GENERAL PRACTITIONER'S IDEAL OUTFIT."

From this wall cabinet we can obtain the high-tension faradic current, the galvanic current, the combined galvanic and faradic current, the interrupted galvanic current, and also current for electrolysis and illuminating diagnostic lamps; if the alternating current is available, the sinusoidal current can also be obtained.

This wall cabinet is arranged with our high-tension coil with slow pendulum vibrator and rapid singing vibrator—both adjustable. The graduated automatic rheotome can be used in the galvanic or faradic circuits, giving interruptions from 20 to 400 times per minute. The Carpentier-Deprez milliamperemeter has two scales reading from 0 to 10 and 0 to 200 milliamperes; it has also an adjustable dial, together with shunt plug. The German silver rheostat with graduated dial under sealed glass, is also mounted on this cabinet, thus all contacts on the resistance in the rheostat are protected.

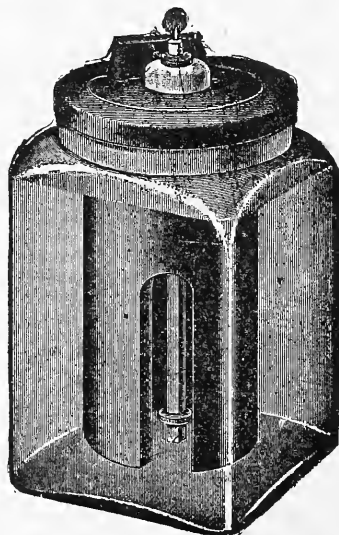
This finely finished outfit is certainly conveniently arranged to obtain quick and ready service.

This wall cabinet is wired for direct current, alternating current and for cell current.

No. 331. Price, including cords, handles and sponges\$42.50

Every instrument carefully tested and guaranteed. Complete instructions accompany each outfit.

Chloride Ammonium Solution Cells and Dry Cells



No. 382. Illinois Carbon Cylinder Battery, price, complete\$0.28

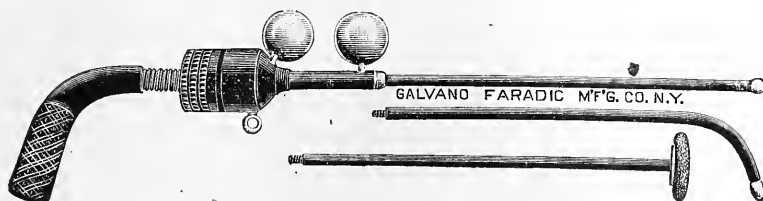


No. 383. 1900 Dry Cell, price \$0.22

No. 384. Columbia Dry Cell, price25

We can supply you any form of chloride of ammonium cells or dry cells of any size or style on the market and in any quantity. Write for special quotations.

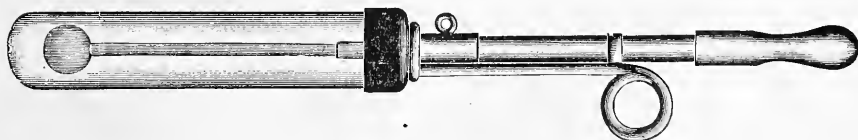
Prof. W. J. Morton's Static Universal or "Pistol" Electrode



This electrode is so named because the administrator may, by a simple motion of the finger in operating the circuit-breaker, change his treatment from sparks to current, and vice versa, and because a great variety of terminals may be quickly attached to it, adapting it to the customary forms of application desired for galvanism and faradism. It will be recognized as a great convenience in a single sitting to turn at once from the spark treatment to an agreeable, regulatable, efficient current for use about the face and neck, and wherever else desired to uncover the skin, or to introduce, by adding a suitable terminal electrode, within a canal or cavity.

No. 466. Price\$12.00

Prof. W. J. Morton's Static Director Electrode



This electrode is for the purpose of administering sparks to the cavities of the body, and may also be used to localize exactly the sparks upon the exterior of the body.

No. 467. Price\$10.00

Prof. W. J. Shield's Volt Graduator

Galvanic
Faradic and
Cautery



Perfect in
construction and
cannot be
injured by short
circuiting

This apparatus is constructed of quarter-sawed oak, antique finish, highly polished; hard rubber base board; nickel-plated metal parts; solid rubber castors, 3½ inches in diameter, attached to metal plates; drawer and door in front and panels on the other three sides.

It may be connected to lamp socket by means of cord and attachment plug attached to back of cabinet.

Attached to either direct or alternating current it will produce the following currents: Galvanic—continuous, momentary contact or momentary interruption; sinusoidal; faradic—primary and secondary, low and high tension, rapid interrupter and adjustable rheotome with rythmical motion, both fall-of-potential and movable coil regulations; galvanic and faradic combined in any ratio with each under separate control; slow faradic superimposed upon high frequency sinusoidal—each under separate control; cautery current; diagnostic lamps (endoscopes, etc.) may be lighted independent of cautery or galvanic current.

All are closely regulated. Controlling arm moves over scale graduated in volts; mil-ammeter with two scales reading from 0 to 20 and 0 to 200. Mil-ammeter has permanent magnet and is "dead beat."

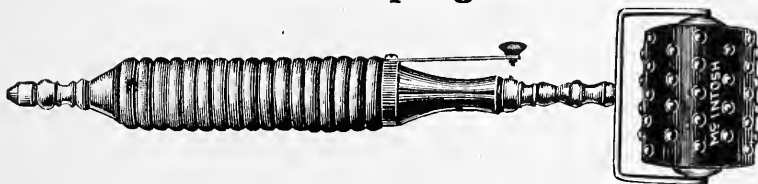
When cabinet is attached to direct current a motor-generator is used to generate the cautery and sinusoidal currents. The motor-generator used is a large multipolar machine with two separate windings.

When cabinet is attached to alternating current, dry cells or a motor-generator are necessary to produce the galvanic current.

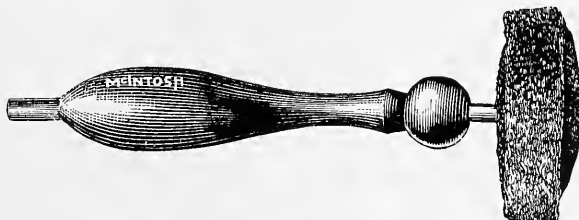
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| No. 385. | Price, equipped for alternating current, including 36 cells. | \$175.00 |
| No. 386. | Price, equipped for alternating current, including motor-generator | 230.00 |
| No. 387. | Price, equipped for direct current, including motor-generator | 210.00 |

The above prices include our reversible and changeable sponge electrodes with silk cords; cautery cables, handle and knife, endoscope with mirror and tongue depressor, and auriscope. This cabinet may be used with cells where electric light current is not available.

Handles and Sponge Holders



- | | | | |
|----------|---|--------|----|
| No. 389. | Roller Electrode of hard rubber, set with metallic points for muscular faradization; universal hard rubber handle, with current interrupter | \$2.00 | 8c |
| No. 390. | Handle only | 1.00 | 6c |



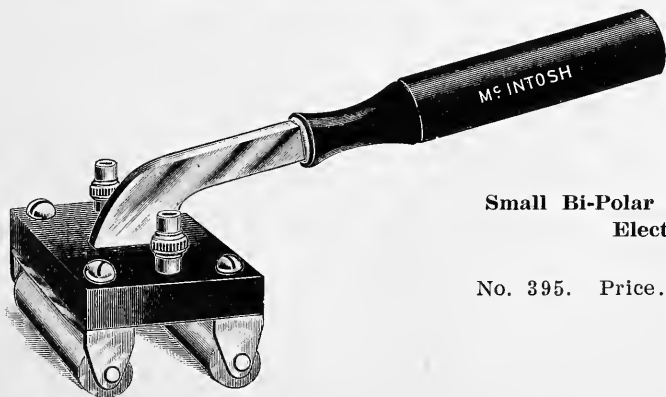
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| No. 391. | Universal Handles, with spongio-covered discs, per pair | \$0.50 | 6c |
| | Spongio Discs, per pair | .25 | 3c |
| | Spongio Discs, 'per pair | .30 | 3c |
| No. 392. | Universal Handles, with set screw, per pair | .35 | 4c |



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|----------|---|--------|----|
| No. 393. | Universal Handle, with interrupter, wood, each | \$0.50 | 4c |
|----------|---|--------|----|



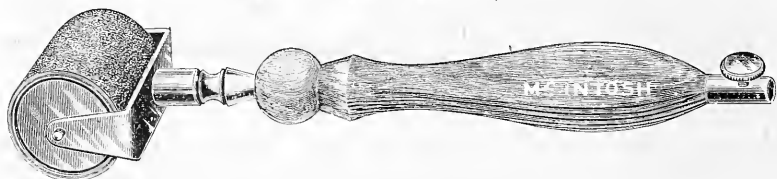
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| No. 394. | Gem Metal Handles, per pair | \$0.30 | 6c |
|----------|-----------------------------------|--------|----|



Small Bi-Polar Roller Massage
Electrode

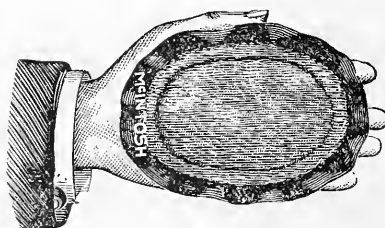
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| No. 395. | Price..... | \$2.00 | 20c |
|----------|------------|--------|-----|

Massage Roller, Chamois Covered Roller for Facial Massage



No. 396. Price\$1.00 Postage 10c

Sponge Electrode



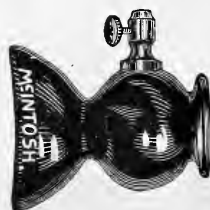
No. 397. Spongio-covered Electrode, insulated with soft rubber for general application with the hand\$0.50 Postage 3c



No. 398. Dr. Sharp's Single Nasal Electrode, solid copper....\$0.75 Postage 3c
No. 399. Dr. Sharp's Double Nasal Electrode, solid copper.... 1.50 5c



No. 400. Small Eye Electrode\$0.50 Postage 3c



No. 401. Double Eye Sponge Electrode, adjustable\$1.00 Postage 6c
No. 402. Eye Cup Electrode, new style 1.00 6c



- No. 403. Laryngeal Electrode, nickel-plated, insulated\$0.40 Postage 3c



- No. 404. Tonsil Electrode, nickel-plated\$0.75 Postage 3c



- No. 405. Rectal Electrode, nickel-plated\$0.50 Postage 5c



- No. 406. Rectal Electrode, insulated with polished hard rubber, N. P.\$0.75 Postage 5c
No. 407. Rectal Electrode, insulated, pure copper 1.00 5c



- No. 408. Rectal Electrode, large, nickel-plated\$0.60 Postage 5c



- No. 409. New Style Rectal Electrode, insulated\$0.75 Postage 5c
No. 410. Special for Hemorrhoids, made of pure copper 1.00 5c



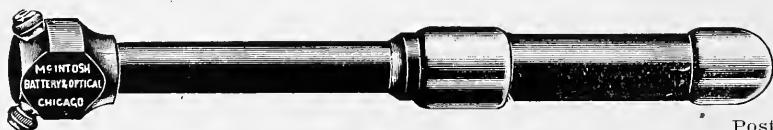
- No. 411. Curved Rectal Electrode\$1.25 Postage 6c



- No. 412. Vaginal Electrode, nickel-plated\$0.50 Postage 5c



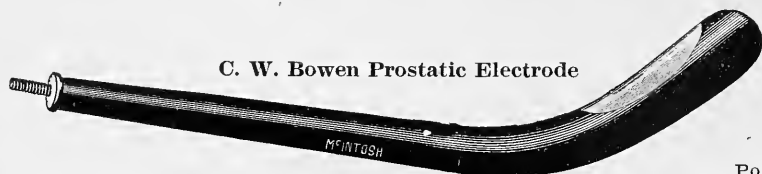
- No. 413. Curved Vaginal Electrode, insulated\$1.25 Postage 6c



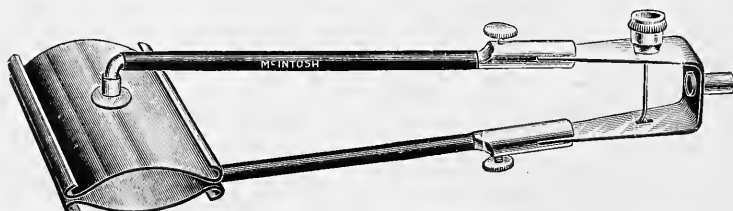
- No. 414. Dr. A. H. Goelet's Bi-polar Vaginal Electrode\$2.00 Postage 6c



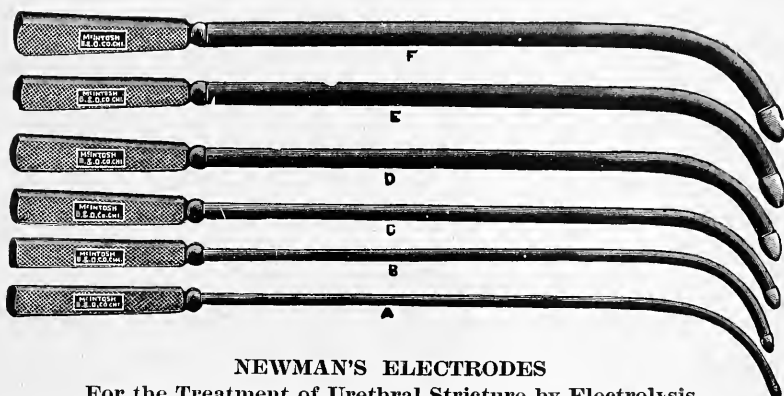
- No. 415. Goldspohn's Vaginal Electrode, copper ball on insulated stem\$0.75 Postage 5c
 We can furnish carbon ball, if preferred, on insulated stem, price 1.25 5c



- No. 416. Price\$3.00 Postage 10c



- This is a uni-polar divided current electrode designed to be used on the positive pole, consequently the terminals are of pure block tin which will stand the corrosive action of that pole. The terminals should be covered with wet cotton and placed on either side of the enlarged mass of blood vessels.
- No. 417. Neiswanger's Electrode for the treatment of varicocele\$1.00 Postage 10c



NEWMAN'S ELECTRODES

For the Treatment of Urethral Stricture by Electrolysis

These electrodes are made with the hard rubber insulation, vulcanized onto the metal stem, thus guarding against all danger from septic poisoning.

- | | | |
|----------|--|-----------|
| No. 418. | Newman's Electrodes, curved, sizes 12 to 28, French, | Postage |
| | each | \$1.00 6c |
| No. 419. | Set of 6, in velvet lined morocco case | 7.50 40c |



- | | | |
|----------|---|------------|
| No. 420. | Neiswanger's Cataphoric Electrode for making applications to the prostatic urethra, as shown in cut.... | Postage |
| | | \$1.00 10c |
| No. 421. | Neiswanger's Cataphoric Electrode, with perforations covering full length of stem | 1.25 10c |

The staff is composed of hard rubber throughout, hollowed to receive the applicator.

For $1\frac{1}{2}$ inches and commencing $\frac{1}{2}$ inch from the distal end, are bored a number of small holes through which electrical connection is made or medicament applied to the prostatic urethra.

The applicator is a twisted wire upon which absorbent cotton may be placed, saturated with any desired medicament.

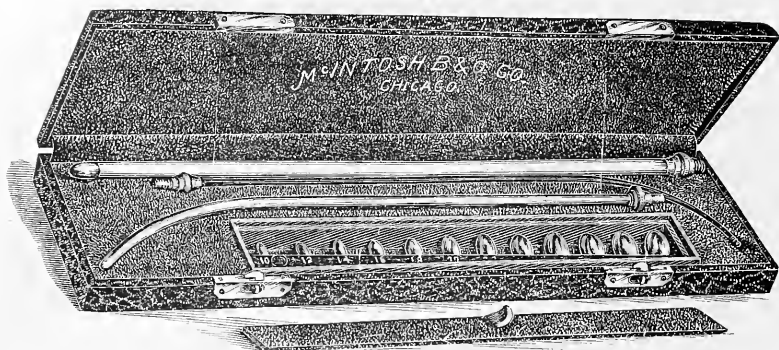


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| No. 422. | Spiral Flexible Uterine or Urethral Electrode, insulated | Postage |
| | | \$0.50 5c |
| No. 423. | Uterine or Urethral Electrode, insulated with hard rubber | .50 5c |



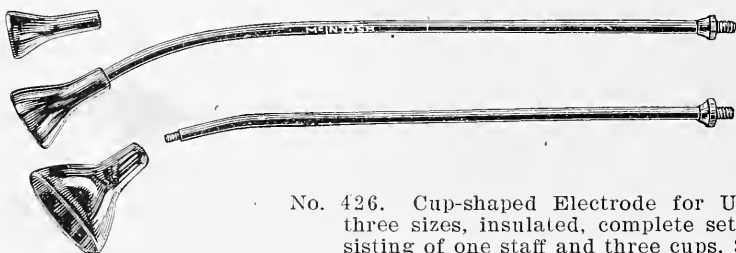
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| No. 424. | Assorted Olives, for No. 423 Electrode | Postage |
| | | \$1.50 10c |

Genito-Urinary Electrode Case



No. 425. Price\$4.50 Postage 40c

This case contains metallic sound, flexible and inflexible urethral electrodes, and two dozen olives, numbered from 10 to 32, French scale, all contained in a velvet lined morocco case, 12 inches long, 3 1/4 inches wide.



No. 426. Cup-shaped Electrode for Uterus, three sizes, insulated, complete set, consisting of one staff and three cups, \$3.00. Postage, 10 cents.

No. 427. Cup-shaped Electrode for Uterus, staff and one cup only, \$1.50. Postage, 6 cents.



No. 428. Uterine Electrode, with cup and stem, insulated\$1.50 Postage 6c

No. 429. Uterine, cup and stem only 1.00 4c

Note.—The same staff that is used for No. 426 Electrode can be used with this cup and stem.



No. 430. Dr. Martin's Intra-Uterine Electrode, *platinum stem* ...\$7.50 Postage 15c



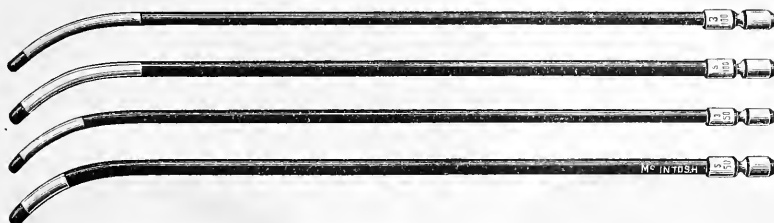
No. 431. Dr. Martin's Fibroid Needle, *platinum point*, insulated. \$3.50 Postage 10c

Dr. Martin's Double Copper Intra-Uterine Electrode



In sets of two. Size of stem as follows: Small, 3 and 5 mm.; large, 7 and 10 mm.

No. 432.	Price, per set of two, including two muffs	\$2.00	Postage 10c
No. 433.	Price, either one only, including one muff	1.00	8c



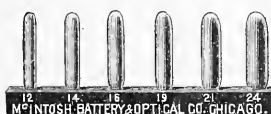
No. 434. Neiswanger's Block Tin Intra-Uterine Concentration Electrodes, insulated tip and stem:

Price, set of four	\$4.00	Postage 10c
Price, one only	1.25	6c

These electrodes can be furnished in copper if desired. Price same as for block tin.

Note.—The active surface of these electrodes is same as Martin's Flexible.

Staff and Olives for Metallic Electrolysis



This electrode is designed to be used for metallic electrolysis. The olive points are either copper or zinc, and range in size from No. 12 to No. 24, French scale. The hard rubber insulation is vulcanized on the metal stem, thus preventing septic matter from obtaining lodgment between the metal and insulation.

No. 435.	Price, two stems and set of six olives (zinc or copper),	\$2.50	Postage 6c
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No. 436.	Apostoli Bi-polar Intra-Uterine Electrode, price	\$2.00	Postage 6c
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- No. 437. Goelet's Intra-Uterine Negative Dialating Electrode. Postage
 Set of three with one stem\$1.25 6c
 No. 438. Same as above, in pure copper 1.50 6c

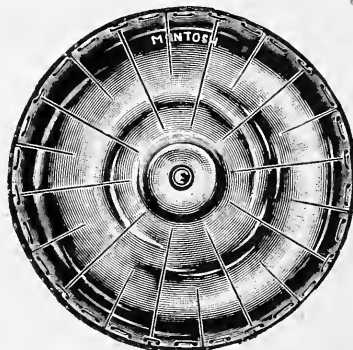


Dr. A. Goldspohn's Intra-Uterine Electrode, contact of copper one and one-half inches long.

- Postage
 No. 439. Price, per set of four, sizes 12 to 20, French\$3.00 10c
 No. 440. Price, one only 1.00 5c



FACE



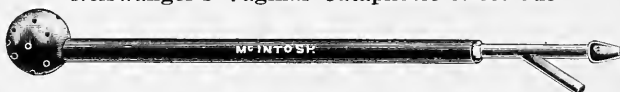
BACK

Dr. P. S. Hayes' Spongio Piline-Abdominal Electrode

- Postage
 No. 441. Block Tin, price\$1.25 15c

Note.—This electrode should be thoroughly saturated with water and placed over the abdomen upon a piece of chamois skin which has been soaked in warm water.

Neiswanger's Vaginal Cataphoric Electrode



- Postage
 No. 442. Price\$2.50 10c

This new and original instrument was designed by Dr. C. S. Neiswanger, the well-known electro-therapeutist. It consists of a ball of pure copper, pierced by numerous holes, and fitted to a small brass tube, which is insulated by a coating of hard rubber. The insulated tube is surmounted by a nozzle for attachment with a syringe, as well as a connection for the conducting cord. The instrument affords a means of applying the oxy-chloride of copper, together with a cataphoric dosage of a desirable medicament.

Dr. Neiswanger uses it with marked success in cases of fibroid tumors, employing in connection a solution of suprarenal, adrenalin or thuja. He has also utilized it in cases of inflamed ovaries and tubes, omitting the drug application.

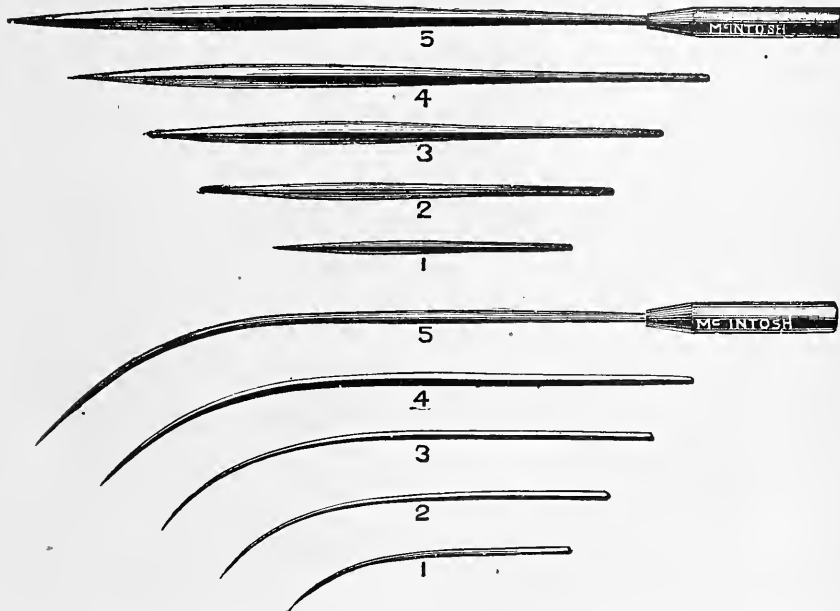
Copper Fistula Electrode



No. 443. Price\$0.50 Postage 5c

This electrode has been found useful in treating fistulae, by applying the oxy-chloride of copper in connection with the positive pole of the galvanic current. The tip of the electrode is of a bulbous shape, which permits of an easy introduction to the affected tract.

Needle-Holders and Needles for Electrolysis

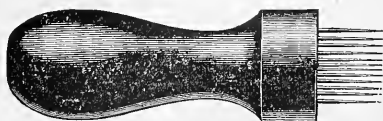


No. 444. Gold-Plated Needles for Electrolysis. Straight, half curved, flattened needles (shown in cut full size).
Extra heavy triple gold-plated. Price of Nos. 1, 2, 3, 4 and 5, each, including needle tip-holder\$0.40 3c
We furnish needle tip-holder with each needle without extra charge.
No. 445. Price of Needle Tip-Holder only\$0.10 Postage

Platinum Needles

We have platinum needles full size shown in cuts of No. 444, straight or half-curved.

No. 446. Each\$2.00 Postage 3c
No. 447. Each 2.50 3c



No. 448. Needle Disc, for the removal of "pigmentary naevus" or wine marks\$2.00 Postage 3c



No. 449. Haemorrhoidal Needle Holder. Price\$1.00 Postage 5c

The No. 5 Cambric Needle is the most satisfactory to use with this holder.
Selected carefully with reference to straightness.



No. 450. Dr. W. E. Casselberry's Bi-polar Needle Holder\$1.00 Postage 5c



No. 451. Hard Rubber Needle Holder, short, price\$0.75 Postage 3c



No. 452. Hard Rubber Needle Holder, with interrupter, price ..\$1.00 Postage 3c

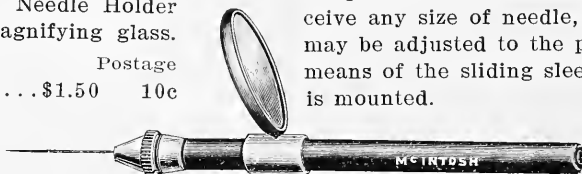


No. 453. Hard Rubber Needle Holder, round, price\$0.75 Postage 3c

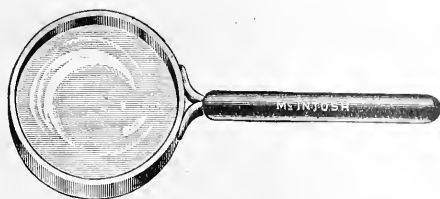
No. 454. Needle Holder
with magnifying glass.

Price\$1.50 Postage 10c

A new and convenient device for use in epilation. The needle holder will receive any size of needle, while the lens may be adjusted to the proper focus by means of the sliding sleeve on which it is mounted.



No. 455. Depilatory Forceps, price\$0.40 Postage 3c

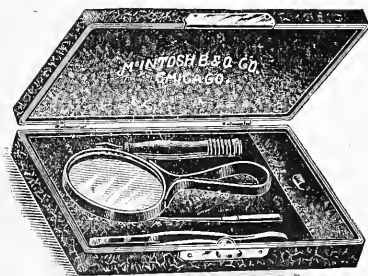


No. 456. Magnifying Glass, price.....\$0.50 Postage 5c

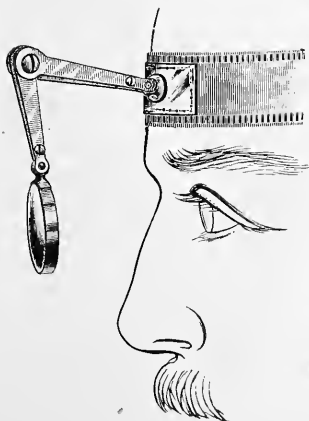
Needles for Epilation

		Postage
No. 457.	Steel Needles (Broaches) for removing hair, price each	\$0.05 3c
No. 458.	Steel Needles (Broaches) for removing hair, price per doz. ....	.50 3c
No. 459.	Hayes' Bulbous Pointed Needles, price each .....	.10 3c
No. 460.	Hayes' Bulbous Pointed Needles, price per doz.	1.00 3c
No. 461.	Iridio Platinum Needles, sharp point, each .....	.30 3c
No. 462.	Iridio Platinum Needles, bulbous pointed, each ....	.40 3c

Case No. 463 is designed expressly for removal of hair, and contains two fine iridio-platinum needles, two steel brooches, four Hayes' bulbous pointed needles, insulated handle, epilation forceps and magnifying glass.



No. 463. Needle Case, price\$3.75 Postage 10c



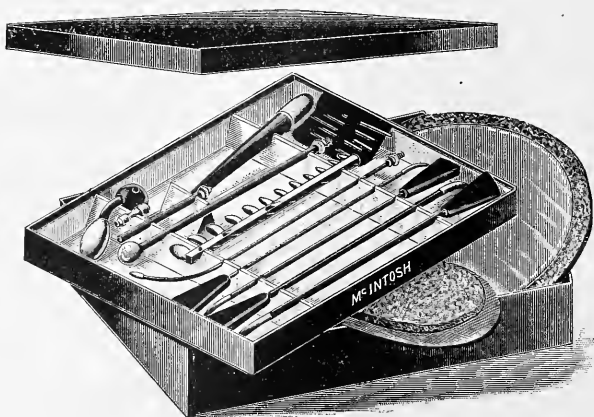
Neiswanger's Magnifying Glass

Mounted on Head Band.

In the operation for the removal of superfluous hair by electrolysis, a good magnifying glass is an essential requisite, and as it is a matter of great inconvenience to use the ordinary glass (both hands being already employed with needle and forceps) the above has been devised. It is light and convenient, and can be used on the head of the operator or patient. Being provided with two joints it is easily and quickly adjusted and the focal distance being five inches allows of ample working room between the glass and seat of operation.

No. 464. Price\$1.50 Postage 10c

The Practitioner's Electrode Set No. 3



No. 465. Price\$10.00

This set has been endorsed by Dr. C. S. Neiswanger of Chicago, the well-known electro-therapist.

1 No. 415 Goldspohn's Copper Ball Vaginal Electrode	\$0.75
1 Hard Rubber Insulated Urethral Electrode .....	.50
1 No. 424 Set (12) Assorted Olives for above	1.50
1 No. 410 Copper Rectal Electrode	1.00
1 Set (4) No. 439 Goldspohn's Copper Intra-Uterine Electrodes	3.00
1 No. 413 Insulated Curved Vaginal Electrode	1.25
1 No. 441 Hayes' Spongio Pileus Abdominal Electrode	1.25
1 No. 397 Hand Spongio Electrode .....	.50
1 No. 453 Hard Rubber Needle Holder .....	.75
6 Hayes' Bulbous Pointed Steel Needles .....	.60
1 Universal Electrode Connector .....	.10

Physiology and Therapeutics of the Sinusoidal Current

There are several physical peculiarities possessed by the sinusoidal current which help to make its action on the body different from that of other forms of current.

The increase and decrease of potential in this form of current is gradual and uniform and never abrupt nor sudden in its change.

The sensory and motor mechanism of the body is capable of adjusting itself to a considerable range of difference in external conditions without serious disturbance or discomfort, provided the change is not too sudden or violent.

The number of alternations per second, the degree of electro-motive force and the quantity of current are, no doubt, each important factors in determining the physiological and therapeutic effects of this current; but these are not so peculiar to it as is this feature of uniformity in change. **THE EFFECT OF THIS SPECIAL FEATURE OF THE SINUSOIDAL CURRENT IS TO LESSEN THE DISAGREEABLE EFFECTS OF ELECTRIC EXCITATIONS BOTH ON THE SENSORY AND MOTOR MECHANISM.** The same amount of stimulation to muscular action cannot be aroused by any other equally powerful means, without the accompanying pain and consequently without the shrinking and apprehensiveness on the part of the patient which other forms of excitation arouse.

It has been highly spoken of by many competent electro-therapists as a means for **IMPROVING THE NUTRITION AND GROWTH OF MUSCULAR TISSUES** whenever it is failing from lack of proper excitation.

The Improved Sinusoidal Apparatus

For use with the 110-volt direct current

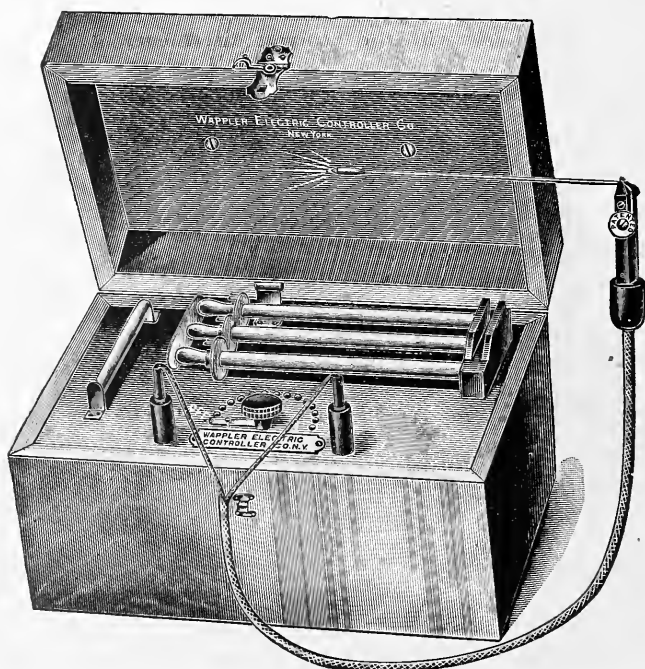


The instrument consists of a small motor wound for the 110-volt direct current and has connected with it a special rheostat for controlling its speed. The shaft of the motor is extended and carries on this extension the armature of the sinusoidal machine, thus making a very convenient and compact arrangement, doing away with belts and pulleys. The armature carrying the windings of the coils of wire in which the induced sinusoidal currents are generated revolves between the poles of a group of two powerful permanent magnets, the pole pieces of which are so shaped as to secure a uniform gradation in the lines of force which cut across the revolving coils on the armature. From the coils the current is conveyed to binding posts on the base of the instrument, but before the circuit reaches the binding posts a graphite rheostat is interposed regulating the strength of the current.

No. 450. Price, complete, as above, including connecting cord and plug, and conducting cords, handles and sponge discs\$50.00

Chetwood's Urethroscope

For Direct Illumination of the Urethra



This instrument embodies the features of an ideal urethroscope.

It facilitates ocular inspection of the canal for diagnostic and operative purposes by direct illumination, which has not been attained successfully heretofore except by means of a complicated, expensive and troublesome apparatus, requiring the addition of a water cooling device to carry off the excessive heat generated during illumination.

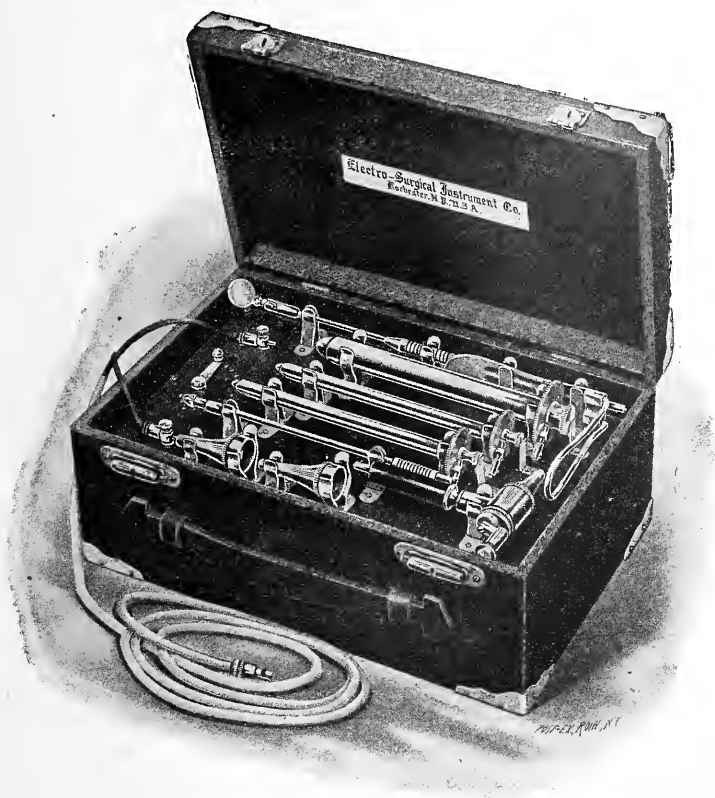
The new Urethroscope has a tiny incandescent lamp fitted to the end of a long metal stem or lamp carrier, which furnishes a brilliant light, but at the expenditure of less than one watt electrical energy. The resulting thermal effect is absorbed by the metal holder and thus there is no rise of temperature perceptible to the patient.

The light carrier, which is the most important part of the instrument, is made to occupy a very small space in the endoscopic tube and is held firmly in place during use. The handle of the light carrier is provided with a rotary switch, by means of which the light is turned on or off with great ease. Burnt out lamps can be removed and new ones inserted without difficulty. The tubes are made of silver or nickel-plated brass, in sizes most commonly employed and numbered on the French scale.

The whole apparatus is fitted in a hardwood box containing a dry cell battery, which may be renewed at small expense.

No. 451. Price\$25.00

Physicians' General Diagnostic Outfit



This is a very convenient case of diagnostic instruments consisting of case and battery with cord; one Auriscope with three specula; one Laryngoscope; one Tongue Compressor; one General Diagnostic Illuminator; one Koch Urethroscope (any size); one Light Carrier for urethroscope (interchangeable); one Rectal Tube, and Light Carrier for Rectal Tube.

As shown in the illustration the instruments are all securely held in heavy nickel-plated clamps, which are screwed to the rheostat board, the whole making a convenient and portable outfit.

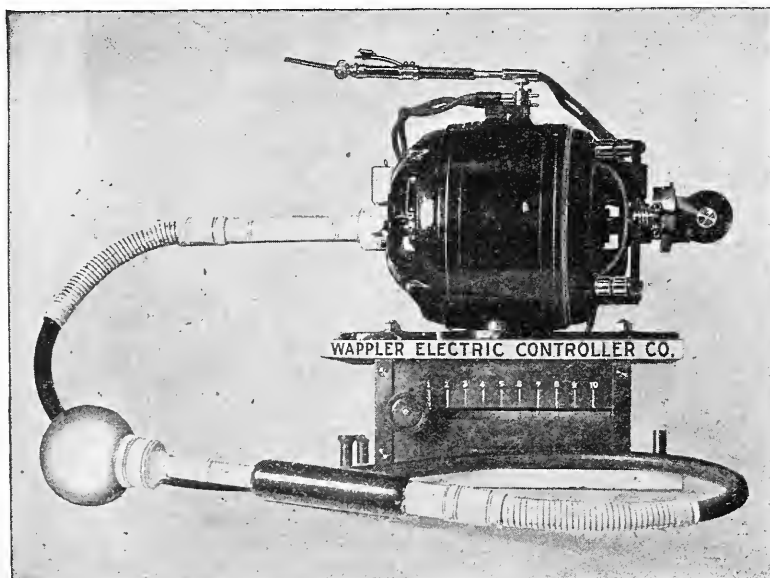
The auriscope gives the operator a magnified field and at the same time plenty of room to make applications or manipulate probes without interfering with light or vision. No reflector is needed as the lamp has a condensor or bull's eye blown on the end of the bulb, while not increasing its size, throws all the light directly forward.

No. 469. Price, complete	\$40.00
Without rectal tube and carrier	33.00

Wappler's Cautery Generator

For Use on the 110-Volt Direct Current

This apparatus, besides its excellent construction for cautery work, is arranged for diagnostic illumination, vibratory massage, pneumo-massage, and surgical drill.



The motor of this instrument has been substantially constructed so that the largest cautery knives are quickly heated and the intense heat maintained during an operation. The motor is quiet in operation, has a perfect speed controller and will light any illuminating lamp requiring six volts.

The Pneumo-Massage Pump can be used for suction, blow, or both combined, and the air can be electrically heated if desired.

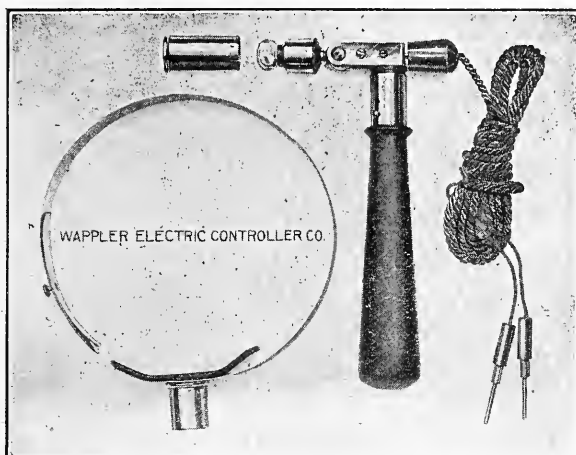
The attachments for Pneumo-Massage comprises an Air Heater and cord, four assorted glass Massage Cups, with rubber tubing, Insufflator Bottle for atomizer effects, Stethoscope and rubber tubing. A small metal spray valve is included for making connections with the Davidson spray tubes.

The vibratory attachment consists of a long piano wire shaft, with all attachments for massaging the various parts of the body.

No. 453.	Price of Cautery Outfit, consisting of Cautery Handle, Cable and three Platinum Electrodes	\$35.00
No. 454.	Attachment for Vibratory Massage, extra	25.00
No. 455.	Pneumo-Massage Pump, extra	25.00
No. 456.	Accessories for Pneumo-Massage, extra	15.00
No. 457.	Surgical Drill, extra	15.00
No. 458.	Complete apparatus	115.00

Phillips' Improved Headlight

Comprising a Headband, Handle, Lamp Holder, Lens, Cords and Two Extra Lamps, Complete, in an Elegantly Finished Case



In presenting this outfit to the physician, we do so with the knowledge that all the objectionable features embodied in the old style headlight have been eliminated. The bi-polar ball and socket joint does away with the short flexible wire, the lamp portion can be detached and used with the handle as an antrum or frontal sinus light or a hydrocele detector, and also for examinations of the rectum or urethral channels.

The lamp can be operated from the street current source, by means of a current controller, or from a four-cell pocket battery.

No. 500.	Price	\$10.00
No. 501.	Price, extra for Controller	9.00
No. 502.	Price, extra for Batteries	2.50

Wappler's Electric Controller

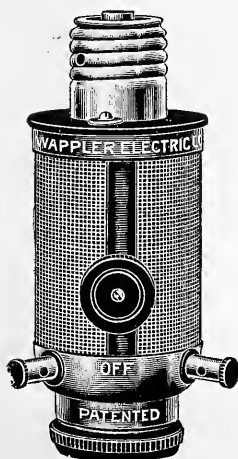
For either the direct or alternating current.

This controller embodies a regulating socket which regulates the brilliancy of the incandescent light by diminishing the flow of current, and acts as a deriving socket, to which diagnostic light outfits can be readily attached.

It is suitable for the 110-volt, 16 candle-power lamp circuit. A short circuit of the line cannot happen with this attachment. Connect the diagnostic outfit to the binding posts on controller and by means of the thumb screw regulate the current desired in the smaller lamp. While doing this work, a 16 candle-power blue lamp should be placed in the socket to act as resistance from the line.

In connection with its use as a light regulator, it can be used for controlling small faradic coils, small motors, electrolytic baths, dental mallets, and small heating devices.

No. 501.	Price	\$9.00
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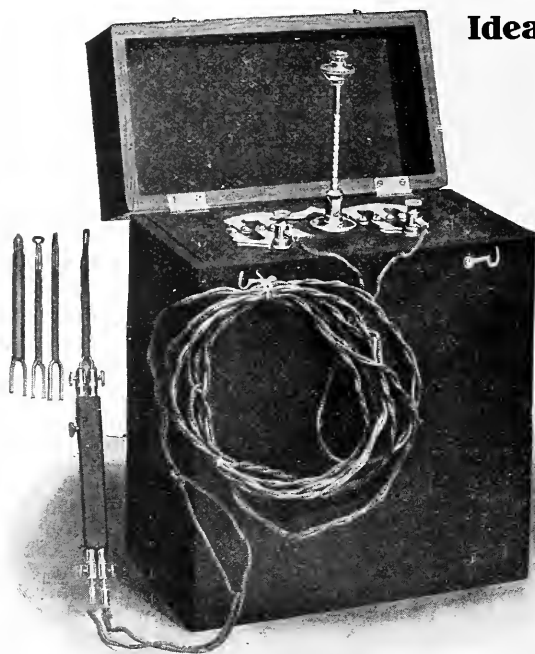
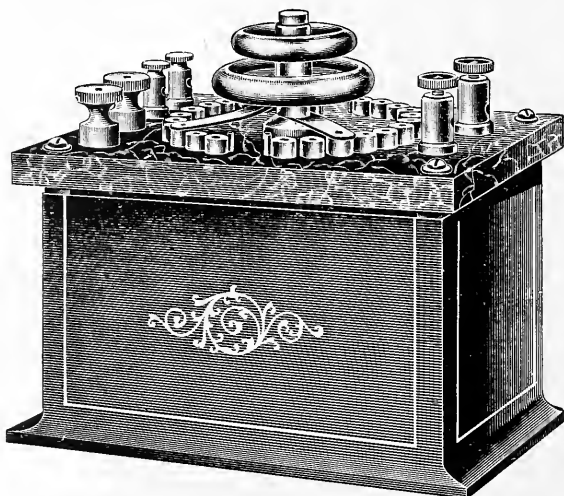


Cautery Transformer for Alternating Current

This transformer is ready for immediate use upon the alternating current. It is simply necessary to connect the same to any lamp socket and control the amount of current by the wheel rheostat on top of the transformer. It is so arranged that the cautery can be heated and a diagnostic lamp lighted at the same time.

No. 459. Price . \$20.00

No. 460. Complete, with best cautery handle, cautery cable, three knives and cord from socket to transformer, \$30.00



Ideal Cautery Battery

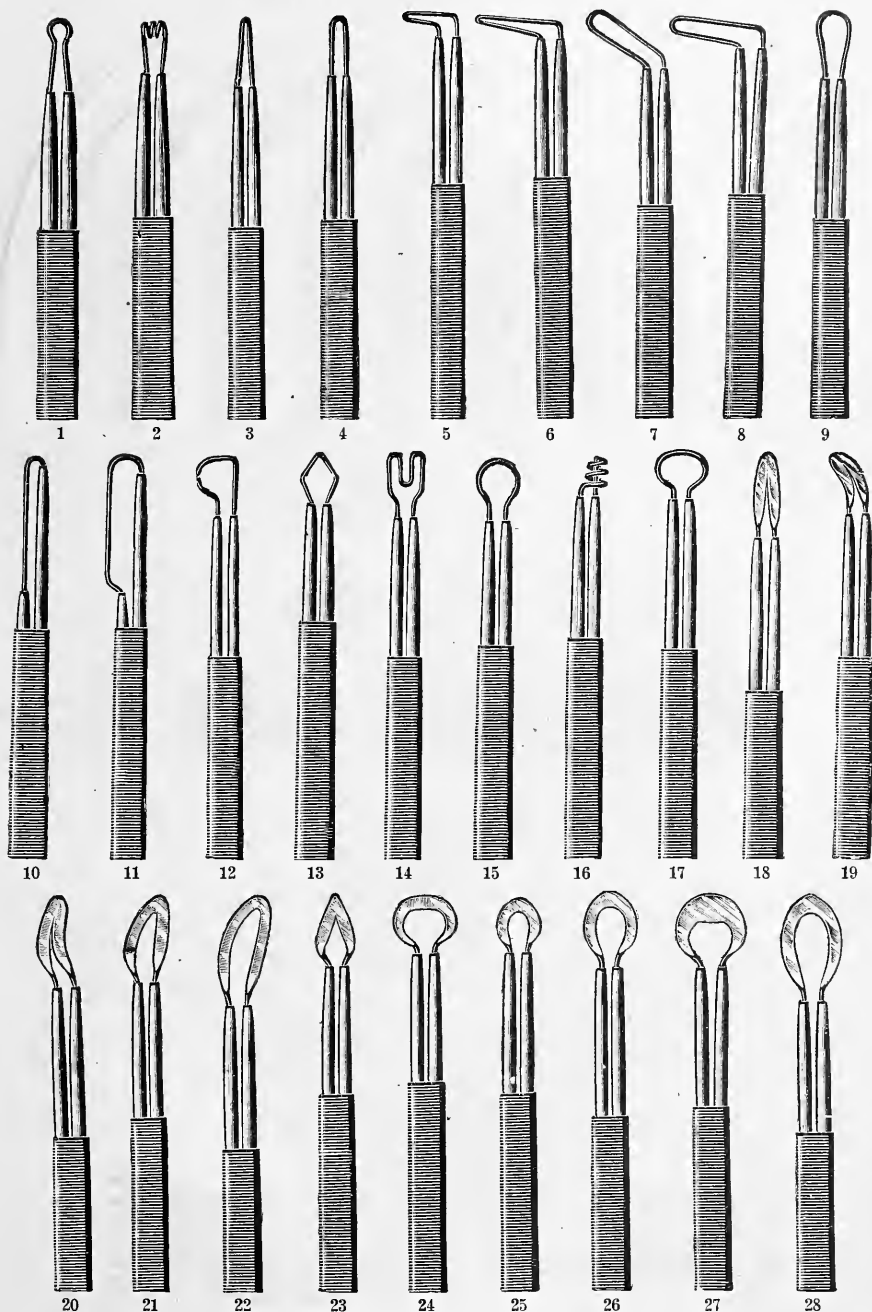
This battery is large and powerful and is especially adapted for surgical, dental and hospital work, as it heats heavy cautery knives, or for obtaining a strong galvanic current. It is also useful for illumination of cavities. The elements are stationary, and the jars containing the exciting fluid may be raised or lowered so as to obtain any strength of current necessary. The cost of running is small, simple in construction, easy to operate. The case is cherry finish and all metal parts are nickel-plated.

Each outfit is fitted with three cautery knives, one lamp, a handle and one set of cords.

No. 461. Price. \$25.00

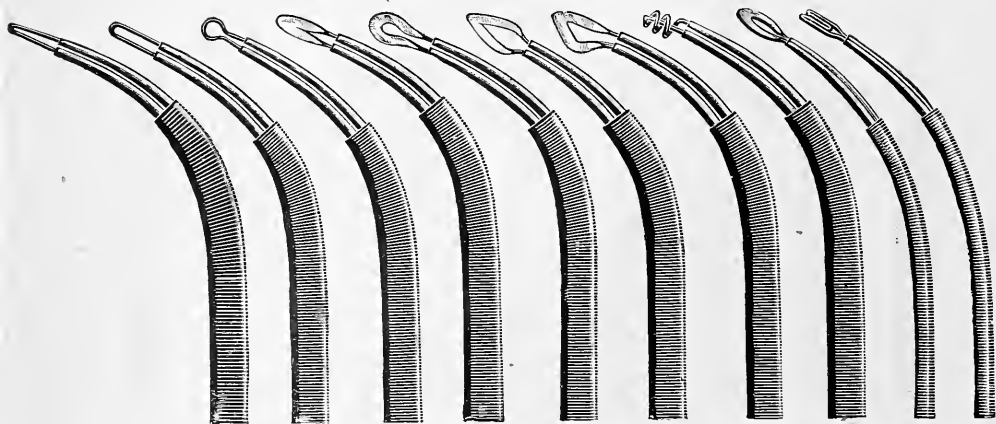
Formula for Fluid: Bichromate of potass, $1\frac{1}{4}$ lbs.; sulphuric acid, 4 lbs.; water, 8 lbs.; bisulphate of mercury, $\frac{1}{2}$ oz. Dissolve the bichromate of potass and mercury in hot water, let it cool, then add, very slowly, the sulphuric acid. When cool it is ready for use.

Cautery Electrodes



- No. 462. Price of Electrodes, Nos. 1 to 19 inclusive and No. 25\$ 0.75
 No. 463. Price of Electrodes, Nos. 20, 21, 22, 23, 24 and 2690
 No. 464. Price of Electrodes, Nos. 27 and 28 1.10

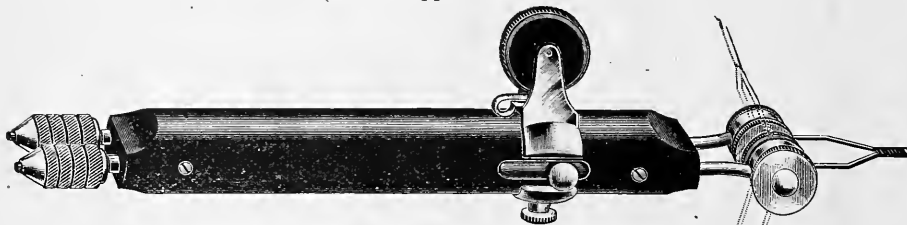
Cautery Electrodes—Continued



No. 465. Price of Electrodes, Nos. 29 to 38 inclusive\$1.00

Cautery Handle

(Patent applied for.)



No. 466. Price, as shown with snare wheel \$4.75
 No. 467. Price of handle, without snare wheel 4.00
 No. 468. Price of Canulas 1.00
 No. 469. Price of Cautery Cords, complete with tips, per pair 2.00

In the cautery handle here illustrated the chucks which hold the cautery electrodes are swiveled in such a manner that the knife or electrode after being inserted in the chucks can be moved to any angle desired, the convenience of this arrangement will be apparent at once.

The switch makes contact by sliding a plunger into a spring chuck or socket, thus insuring perfect contact and great durability.

Chucks are used for holding the cord tips instead of the set screws ordinarily employed, thus there are no projecting thumb screws to give annoyance while handle is being manipulated.

The snare wheel is placed in position by sliding over the handle, and it can be set at any point desired, with the wheel at any desired angle. A spring prevents the wheel from backing up. An ideal instrument for cautery work, finished attractively in hard rubber and nickel.

Western Cautery Handle



No. 470. Price\$3.50

Vibration



HERE is no question in the mind of the intelligent physician of today but that other means than drugs must be employed to alleviate the suffering to which flesh is heir.

Physical therapy offers so much that is useful, and the results obtained by the application of electricity, vibration, hot air, etc., are so marked that the most conservative of the medical profession, who a few years ago held to the old-school methods, have been forced to concede that the time has come for accepting the newer theories and that they have come to stay. Prejudice has given way to reason. Patients have become tired of pouring physic into their stomachs and are demanding more of nature's remedies.

One of the most pleasant as well as effective means of assisting nature to throw off impurities is vibration.

This art has been but little used in this country, although known among the ancients for centuries. Physiologists of old knew that the secretory and vaso-motor nerves readily respond to proper manipulation, and that where an equal circulation is established disease cannot exist.

The sympathetic nervous system extends along both sides of the spinal column for its entire length. It consists of chains of ganglia, from which ganglia fibres pass to the cord, making connection with the whole spinal system. Other fibres pass to the plexus of the chest, abdomen, pelvis and the viscera contained in these cavities, thence to the blood vessels and are carried to all parts of the body. It is, therefore, to this region that vibration should be employed.

While good results can be obtained from the use of the hands, any of the various vibrators of merit is preferred, as treatment can be given more rapidly and with less exertion to the operator.

The effect produced is of varying character, depending upon the pressure, length of stroke and time of application. There are three modes of giving vibration—stimulation, sedation and inhibition.

Stimulation is produced by means of a light pressure, with short stroke, and application for ten seconds. Sedation, by means of medium pressure, medium stroke, applied for fifteen seconds, and inhibition with heavy pressure, long stroke, with treatment of thirty seconds.

In treatment along the spine the patient can sit, with the hands placed upon the knees, back bent forward, or by lying face down upon a table, arms dropped to either side. Pillows can be placed under the head and abdomen if desired. It is best to have the body covered but lightly with clothing and the corset always removed when treating women. For abdominal treatment the patient should lie on the back, knees drawn up to relax the muscles. For treating the solar plexus apply over the stomach and to one side, using force. In the treatment of the lymphatics apply direct with a soft vibrator and use the short stroke. For weak, flabby muscles apply direct as well as to the spinal nerves. Deep muscles and nerve centers require a long, heavy stroke, while those of a superficial nature must have a short, light stroke.

Soft vibratodes must be used if the part is painful and always with a short application, as it is best to return to the spot several times during treatment than to over-stimulate at any time. Use the ball vibrator for deep effects and with the long stroke. Treatment should not be given any case for more than ten minutes.

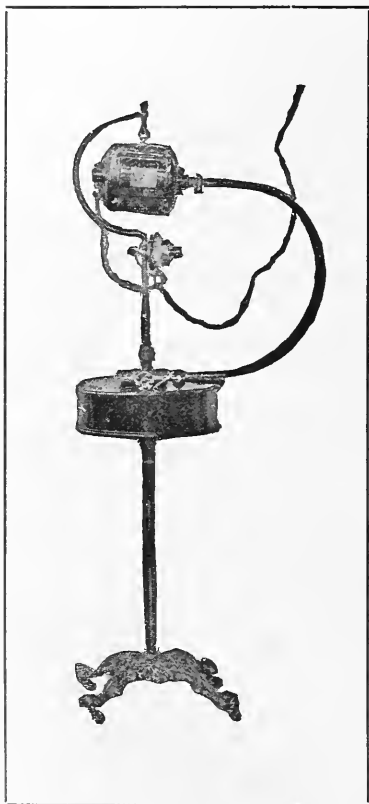
The vibrator will be found useful in relieving all painful and congested conditions, weakened, flabby and paralyzed muscles, diseases of the stomach, liver, kidneys, bladder and intestines, enlarged prostate, rectum, uterus and vagina.

Faithful work must be given. No half-way treatments will give success, and the physician will be amply repaid for every hour spent in careful study of this most interesting branch of science.

The Biehlmaier Vibrator

The Machine with the Perfect Stroke

Absolute Ease of Regulation



The distinctive feature of the Biehlmaier Vibrator is in the character of the stroke. It is not a sudden, hammer-like and violent, but a true, even stroke, developing a perfect vibratory impulse.

The outfit is regularly supplied with a special 1-10 H. P. motor for direct or alternating current, supported by a strong metal floor stand mounted on castors and handsomely finished with oxidized copper plating.

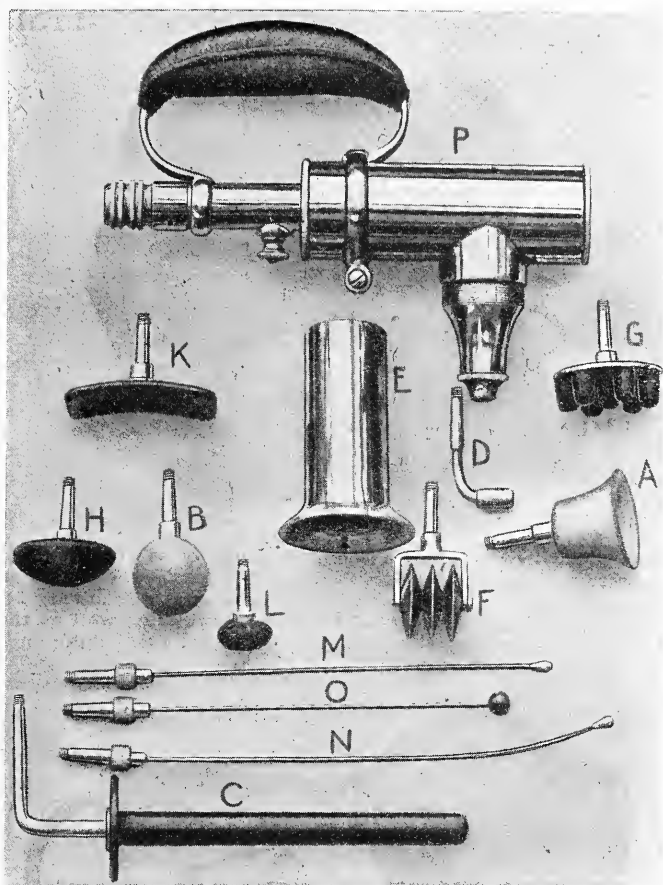
The shaft is made of the finest piano wire, while the sleeve or covering is especially woven, to provide flexibility, with sufficient stiffness to protect the core.

For physicians who prefer it, we can furnish a strong adjustable fall bracket in place of the floor stand.

The vibratodes as shown on the page opposite are packed in a fine leatherette case or in a handsome, round, quarter-sawed oak cabinet as here shown.

The apparatus requires but little attention. To oil the motor, unscrew the caps on each end and fill the cups with vaseline. This need not be done but once a month. To oil the hand piece, unscrew the top end and pack with vaseline or a heavy automobile oil, and oil the small hole in the barrel just above the stem. These parts should be looked after every two or three days, depending upon the use given the vibrator.

No. 471.	Price, for either direct or alternating current	\$85.00
No. 472.	Price, extra, for the oak case	5.00
No. 473.	Price, extra, for the tissue compressor	2.50
No. 474.	Price, extra, for the hand piece holder	2.50
No. 475.	Price, extra, for the special rectal electrode	1.50



"A" Soft rubber cap used in facial and scalp massage. It may be supplied with either straight or angle stem.

"B" Solid soft rubber ball for vibration of the spine and back. It is capable of rendering highest penetration.

"C" Special rectal vibratode.

"D" A special angle attachment to provide the lateral movement with any vibratode.

"E" Special tissue compressor.

"F" Roller vibratode.

"G" Multiple vibratode for stimulation of stomach, liver, abdomen, etc.

"H" Large, soft-cushioned vibratode for general body vibration.

"K" Curved, hard rubber vibratode for throat and neck.

"L" Small, soft-cushioned vibratode for deafness.

"M" Straight probe vibratodes for mucous membranes.

"N" Curved probe vibratode for deafness.

"O" Ball vibratode for the uterus.

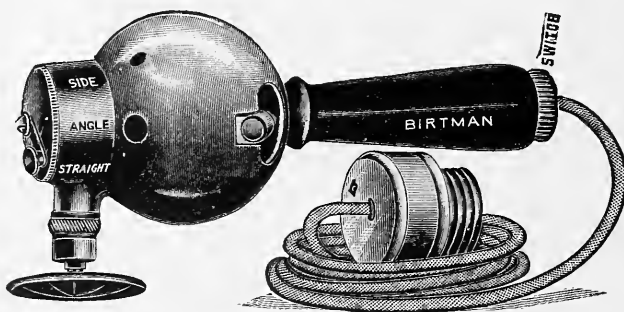
"P" The hand piece is here shown fitted with special holder and threaded for the tissue compressor.

The vibratodes are fitted with threaded tips so they may be screwed into the hand piece, thus preventing falling out during treatment.

The International Electric Hand Vibrator



The illustrated vibrator gives a complete range of vibrator stimulation. It is firmly constructed, neat in design, light in weight and effective in service. The handle is 3 inches in diameter, 7 $\frac{3}{4}$ inches long and weighs only 2 $\frac{1}{4}$ pounds. You can obtain from it the lateral and percussion stroke as well as the angular stroke. All adjustments can be made while holding the handle in the same position.



Cord and plug are attached so that it can be connected to any circuit. Switch for turning the current on and off is conveniently arranged in the handle. No vibration of the operator's hand. It is only necessary to hold the instrument with one hand, even though the deepest vibration is intended.

It is supplied with self-oiling bearings and five of the most useful vibrator applicators including resistance plug.

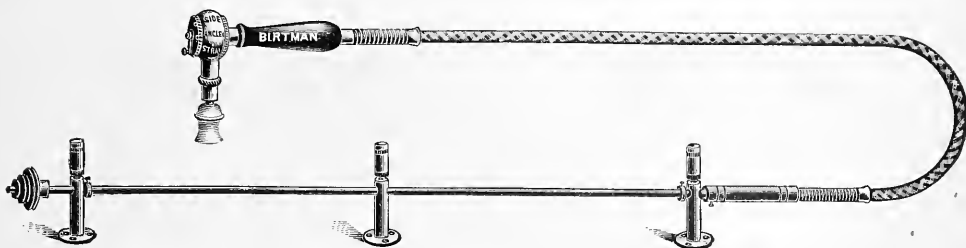
It is mounted in a neat plush-lined leatherette carrying-case.

Supplied for 110 and 220-volt direct and 110-volt 60 cycle alternating current circuits.

No. 496. Price\$45.00

A written guarantee accompanies each outfit.

Vibrator Attachment for Static Machine



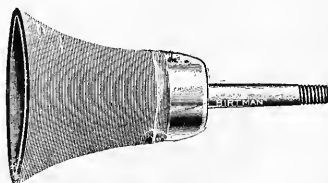
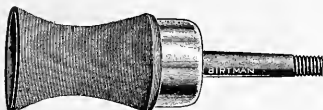
The above illustration of a vibrator is designed to be used on a static machine, eliminating the necessity of buying an additional motor.

The countershaft of this vibrator is secured to the end of the static machine, and the pulley of same is in alignment with the pulley on the motor operating the static machine. This vibrator can be adapted to any static machine of any manufacture.

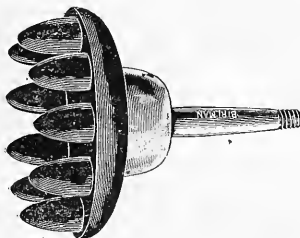
The handle is finely nickel-plated, with a snap switch to change from one stroke to another, which can be changed while the motor is running. The handle is well balanced and with its hard rubber hand support makes it very convenient to hold. It can be operated at exceedingly high speed without vibration to the operator's hand.

No. 497. Price, Vibrator Handle, complete with applicators\$35.00
 No. 498. Price, Countershaft 4.50

Vibrator Applicators



No. 481. Small Facial Cup, price\$0.50
 No. 482. Medium Facial Cup, price50



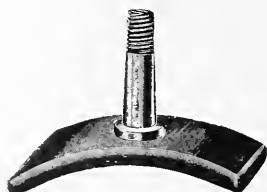
No. 483. Scalp Applicator, price\$0.75



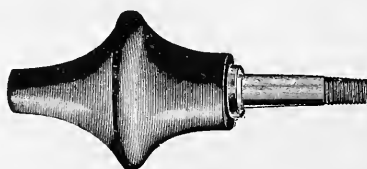
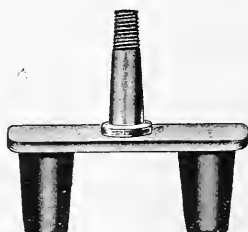
No. 484. External Rectal, price\$0.60
 No. 485. Ball Applicator, price60



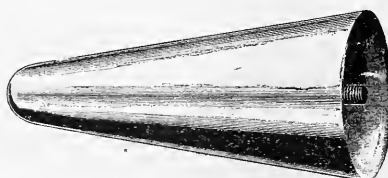
- No. 486. Plain Disc, for muscular vibration, price\$0.75
 No. 487. Corrugated Disc for abdominal use, price75



- No. 488. Curved Applicator, price\$0.75
 No. 489. Flexible Rectal, hard rubber tipped, price 1.50



- No. 490. Spinal Applicator, price\$0.75
 No. 491. Ear Applicator, price75

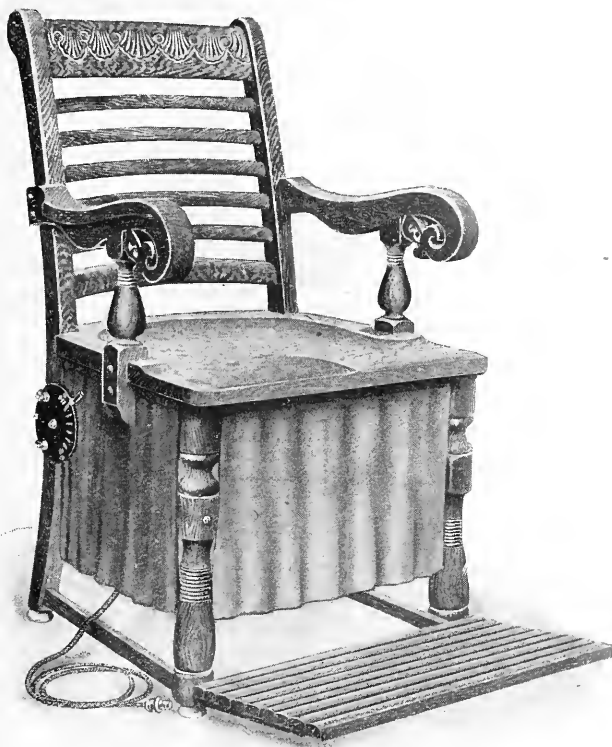


- No. 492. Expanding Rectal Applicator, price\$1.50



- No. 493. Hard Rubber Massage Roller, price\$1.25
 No. 494. Hard Rubber Massage Roller, price 1.25
 No. 495. Soft Rubber Disc, price90

The Gorman Vibrating Chair



The Gorman Vibrating Chair offers an agreeable manner for imparting vibration or exercise without bodily exertion to the patient.

It is so constructed that the entire anatomy is subjected to the vibratory motion, which can be adjusted so that vibration can be given in a very mild manner, or increased to the point equal to that of exercise experienced in horse back riding.

It is especially useful in cases of obesity, shortness of breath, irregular action of the heart, the toning of fat, flabby muscles, in conditions where the age of the patient prevents walking, yet where exercise is imperative to good health and in toning up the entire system.

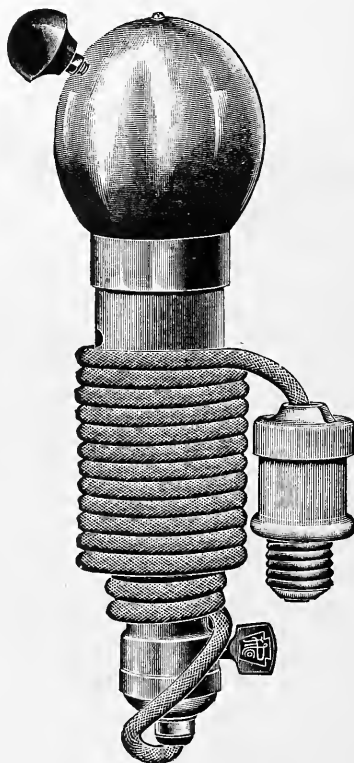
It is operated by a motor with either the direct or alternating current and is ready for attachment to any incandescent lamp socket.

It is constructed in a very durable yet handsome manner and will be found a valuable accessory to the equipment of physicians giving the practice of physical therapy the attention that it so richly deserves.

No. 476. Price\$100.00

Dr. Harry F. Waite's Tissue Oscillator

For Use on the Direct or Alternating Current



The instrument illustrated above, while exceedingly simple, is perfect in construction and will be found a very efficient one in covering the field where mechanical vibration is indicated.

The rapidity of its vibrations exceed 5,000 per minute and can be graduated by the operator from 0 to the limit without stopping its action.

With the exception of the conducting cord connecting with the current, the entire instrument is in the hand of the operator, and the patient can be treated without change of position.

"Mechanical vibration, which properly includes two forms of application—spinal stimulation and vibra-massage—has established an important place in therapeutics which it is certain to fill to the advantage of suffering humanity."

No. 477. Price, for direct current, net\$25.00

No. 478. Price, for alternating current, net 30.00

The International Ozonator



The International Ozonator is mounted in very select oak or mahogany finished cabinet, with the ozone generating boxes mounted upon French plate mirror glass with polished edges. The sides of the ozone generator boxes are incased in bevel plate mirrors.

All of the mountings on the top of the ozonator are constructed of first quality polished hard rubber. Stop-cock, rheostats and switches are mounted thereon to produce the quickest and finest control of the various portions.

All of these International Ozonator machines are shipped set up complete, with cord and plug attached, so that connections can be easily made from supply current.

No. 503. Price, two sitting alternating current machines, complete. \$275.00

No. 504. Price, two sitting direct current machine, complete 350.00

PROTECTED BY UNITED STATES PATENTS.

These International Ozonator machines are fully guaranteed against breakdowns.

International Ozonator Machine



ZONE is formed in the short brush discharge playing between the electrodes. The air thus ozonated is blown through the hard rubber tubes below the surface of the oils in the oil containers, where the last small traces of nitric and nitrous acid fumes are filtered out, and the pure vapor passes through the hard rubber tubes on the corners of the machine to the inhaling masks.

The blower in the base of the cabinet (which has two removable doors) is run by an A. C. motor in the alternating current machine. In the direct current machine it is run by the rotary converter, which also charges the primary of the stationary step-up-transformer, from the secondary of which the high voltage current is passed to the discharge gap between the electrodes in the ozonating boxes.

The entire machine is on castors and can be moved about. The cabinet is arranged with detachable doors, so that the mechanical apparatus is within easy reach to lubricate.

How is it Used?

Insert the plug into an electric socket; then see that the oil in the container is about one-half an inch above the lower end of the rubber tube; turn on the current until a grayish blue vapor forms in the upper part of the oil container; open the stop-cock on this particular oil container; place mask over your face and inhale; regulate strength of vapor by means of stop-cock and rheostat so that inhalation can be made for one-fourth to one-half hour. Inhale deeply. When vapor becomes too strong, regulate by screw on oil container until pleasant.

What Does it Do?

1. The vapor obtained from the machine, which for short will be called "Ozoline," is the most powerful antiseptic, germ-killing agent known; in laboratory tests it has quickly killed pathogenic germs of every description, while, when treating disease by it, it has in the human body done the same (even tetanus germs) without in the slightest way injuring the human body.

It is, in fact, the only absolutely safe germicide for therapeutic purposes. By inhaling for half an hour you can absolutely sterilize the blood, as it becomes saturated with ozoline. As the blood brings nutriment to all the tissues of the body, a course of treatment with ozoline will kill all the germs to which the blood and its serum have access.

Among the germ infections in which it has shown excellent results as a curative agent are: Syphilis, Tetanus, Tuberculosis infections by Staphylococcus, Streptococcus, Typhoid Bacillus, Pneumococcus, Gonococcus.

2. It is a very quick and powerful regulator of the vaso-motor nervous system, and as such has been found of the greatest value in Neurasthenia, Melancholia, Hysteria, Nervous Impotence, Nervous Asthma and other neuroses.

It regulates the peristaltic action of the bowels, a single inhalation of half an hour often bringing on a passage in long-standing, habitual constipation.

Insomnia is quickly cured by it, a refreshing sleep usually following inhalations when taken in the latter part of the day.

3. It increases the number of the red blood corpuscles, so that cases of anaemia will show a constant increase of them under treatment until the normal amount is reached.

4. It increases the oxidation of the food derivatives, so that the bases are properly oxidized and eliminated, thus being of the greatest value in rheumatism, liver and kidney diseases—in fact, in any diseases that depend upon improper metabolism and katabolism.

5. The volatile oils contained in the ozoline vapor are as such, independent of the ozone action, very valuable in diseases of the respiratory organs.

6. The condensed vapor in fluid form, in local application by an endoscope, will cure granulations in the urethra (gleet) in one to two applications; injected into tuberculous joints or carious afflictions of the bones, it will cure these.

7. The oil in the oil containers through which the ozone has passed for some time will, as a dressing, especially when used together with inhalations, cure most skin diseases; it has shown excellent effects also in varicose ulcers of many years' standing.

8. In cases treated by "ozoline" the appetite usually increases, and as better assimilation of the food takes place, the weight usually increases, as for instance in tuberculosis.

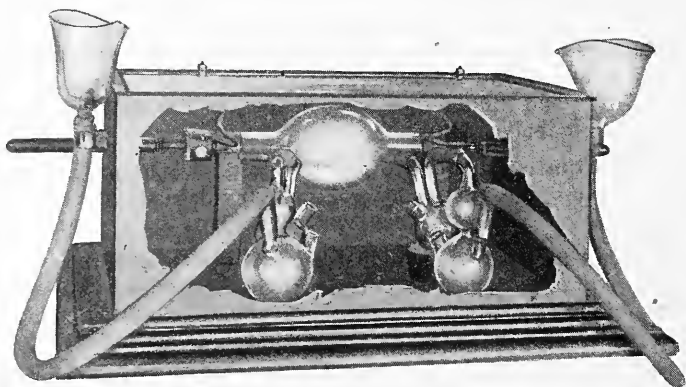
About Treatments

The usual length of time for an inhalation is about one-half hour. By that time usually the blood is perfectly saturated with ozone. In some cases one-fourth hour will suffice, while in several cases even three-fourths of an hour is not too long. An absolute rule cannot be given for this. When the patient is saturated he will usually himself lay down the mask and announce that he is full.

In very severe cases of tuberculosis or syphilis, it may be necessary to let patients inhale twice a day in the beginning of treatment.

The R. F. Ozonator

(Patents applied for.)



The above cut illustrates a simplified apparatus, which is mounted in a handsomely finished case.

The top has a French plate mirror glass so that the patient can see at once how the ozone is made and purified. This plate is removable to enable the practitioner to take out the compartments containing medicated oils for the purpose of cleaning whenever desired, making the apparatus entirely antiseptic. It is so constructed that it can be connected to any static machine, coil, Oudin resonator or high frequency apparatus. No other complicated paraphernalia is necessary. The spark gaps, extending on each side of the case enables the practitioner to increase or decrease the discharge of current, which plies in the shape of a brush discharge, between the electrodes.

The ozone which is made in this form is blown by means of air-pressure through the glass tubings and under and into the medicated oils, where all traces of nitric and nitrous acids are removed, and the result of this procedure is the perfect, purified ozone.

This machine accomplishes all the effects that any other machine of this type, no matter how high-priced it may be, is able to do.

A contact extension on the bulb is left so that the practitioner can easily connect the apparatus to his compressed-air tank. If desired, the machine is furnished with an air-blower and motor as well.

No. 505.	Complete machine as illustrated	\$50.00
No. 506.	With motor and blower	95.00

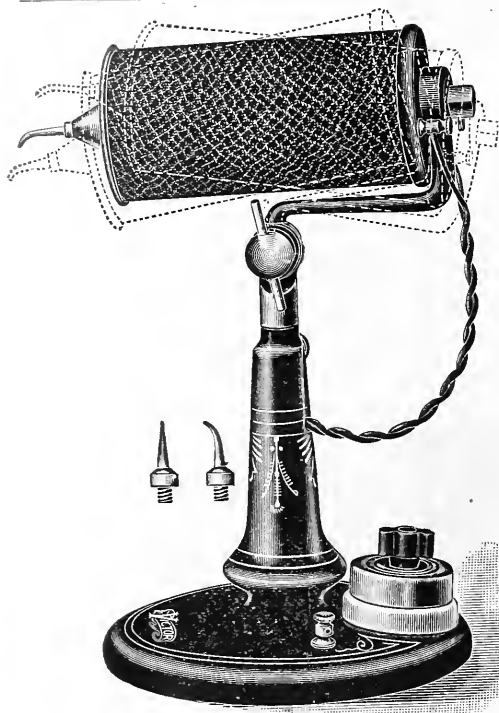
Another Type of R. F. Ozonator

(Patents applied for.)



The above cut illustrates the simplicity of this apparatus. It is made for use on a static machine, coil, Oudin resonator or high frequency apparatus.

No. 507. Price\$15.00



No. 528. Little Giant Eye Magnet

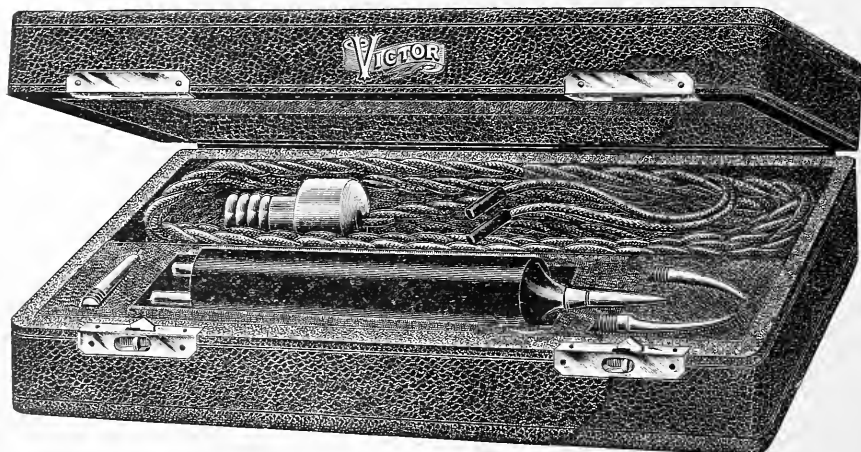
The No. 528 Little Giant Eye Magnet has a little over one-fourth the strength of the large Victor Giant Magnet. It can be raised and lowered, swiveled and tilted. It is provided with two interchangeable gold-plated tips and is equal in appearance and workmanship to the larger magnet.

Every physician should have one of these instruments for emergency cases, even though he does not feel warranted in installing one of the larger outfits. The field strength for a distance of one inch from the point is quite effective, and, although it is not to be compared with the larger magnet, it is an instrument made for use and is in no sense a toy.

No. 528. Price for 110 or 220-volt current or for batteries\$25.00

No. 529. Price of Hand Controller Rheostat\$5.00

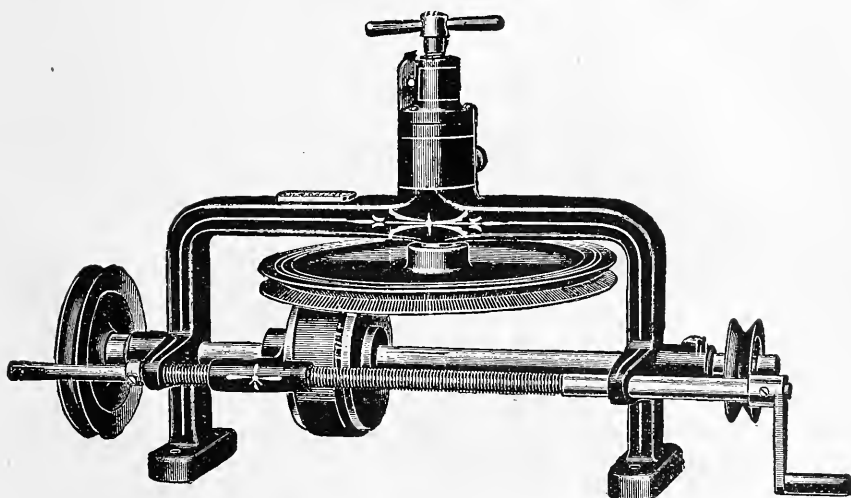
No. 530. Eye Magnet. In Case



This magnet is $5\frac{3}{4}$ inches long without tip, and $1\frac{1}{4}$ inches in diameter; we supply with it 4 gold-plated tips and an attachment plug and cord. The No. 530 is by far the strongest hand or portable magnet on the market; it is completely covered with polished hard rubber, the case is leather covered and plush lined.

No. 530. Price for 110-volt direct current or for batteries complete, as shown in case\$12.00

Speed Controller



- No. 536. Mechanical Speed Controller, to use with alternating current motors, especially adapted for controlling speed for static machines. Price, net\$20.00

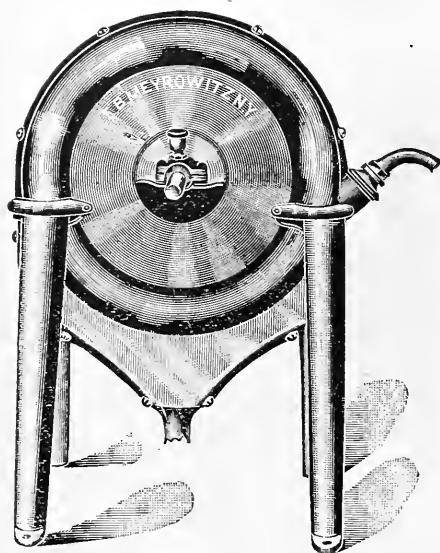
Hygrometer

For measuring the conditions of the atmosphere.

Every static machine should be equipped with a Hygrometer which should be placed within the case. It enables one to see at a glance the condition of the air inside.

- No. 537. Price\$1.50

Water Motors



Where a continuous pressure of at least 45 lbs. can be taken from the water mains in sufficient quantity it is often convenient to use this in preference to other power for obtaining electric current to operate static machines or generators for coil apparatus. One of two methods can be adopted where coil apparatus is to be used—one is charging storage batteries for this purpose, the other is generating sufficient current for direct connection. When the former system is to be used a much smaller generating outfit will suffice, and consequently less water supply is necessary; therefore, we will quote on two sizes.

No. 538. Price of $\frac{1}{4}$ H. P. water motor, requiring a minimum pressure of 45 pounds\$40.00

No. 539. Price of 3 H. P. water motor, requiring same pressure \$125.00

Storage Battery

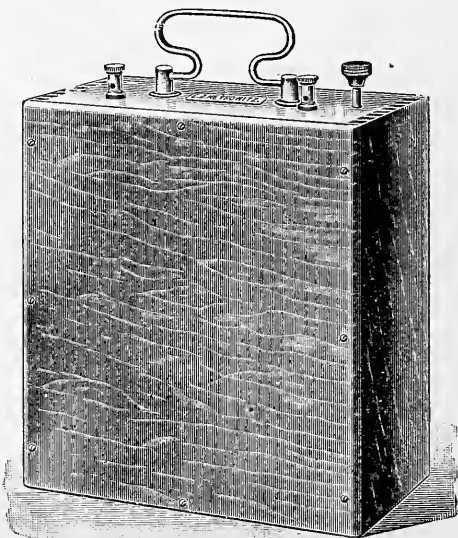
Although storage cells require more or less attention, it is often necessary to use them in connection with X Ray apparatus. If, however, they receive proper care, they are often found very convenient for portable-work, and we recommend them in these cases.

Where the operator has at command a sufficient quantity of water to operate a $\frac{1}{4}$ or $\frac{1}{2}$ H. P. water motor, a small generator can be attached and a set of storage cells kept charged from this source.

No. 540. 20 ampere hour cells in celluloid, each\$10.00

No. 541. 40 ampere hour cells in celluloid, each\$14.50

We also furnish storage batteries in glass jars for stationary work. Prices on application.

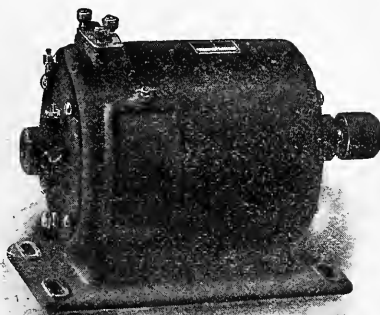


The Emerson

Direct and Alternating Current Motors

This bi-polar cylinder type of direct current motor is entirely enclosed and dustproof. The motor is guaranteed to carry the full load for which it is marked and has been subjected to the most rigorous tests before leaving the factory.

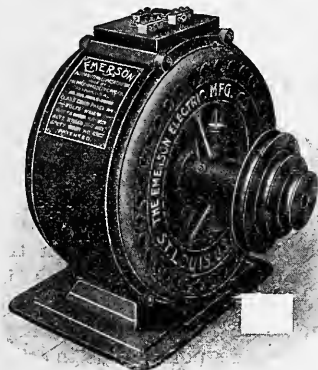
Each motor is fully guaranteed against imperfections and the company will replace or repair at its option, without cost to the purchaser, any motor proving defective within one year from date of purchase from the factory.



No. 542.	Price, $\frac{1}{4}$ H. P. 110-volt direct current	\$35.00
No. 543.	Price, 1-3 H. P. 110-volt direct current	40.00

Alternating Current Motor

Single Phase Induction Motor



This motor is considered perfection for the alternating current.

It has no commutators, brushes nor collecting rings to catch the dust.

The field coils are the only ones in circuit with the line.

The motor is self-starting under full load.

In ordering give voltage and number of cycles.

No. 544.	Price, $\frac{1}{4}$ H. P., 110 volt.....	\$57.60
No. 545.	Price, $\frac{1}{3}$ H. P., 110 volt.....	67.20

W. Green & Company

New York

Direct and Alternating Current Motors



These motors are small, compact, neat and beautifully finished. They are moisture and dust proof, automatic lubricating, with all the parts interchangeable.

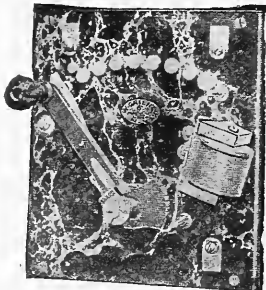
These motors are guaranteed free from electrical or mechanical defect and if any defect is found within one year from date, the defect will be made good.

No. 546. Price, for 110 direct current\$35.00

No. 547. Price, for alternating current 57.00

In ordering, please state for which current the motor is desired and, if alternating, the voltage and number of cycles or frequency.

Controlling Rheostat for the Direct Current

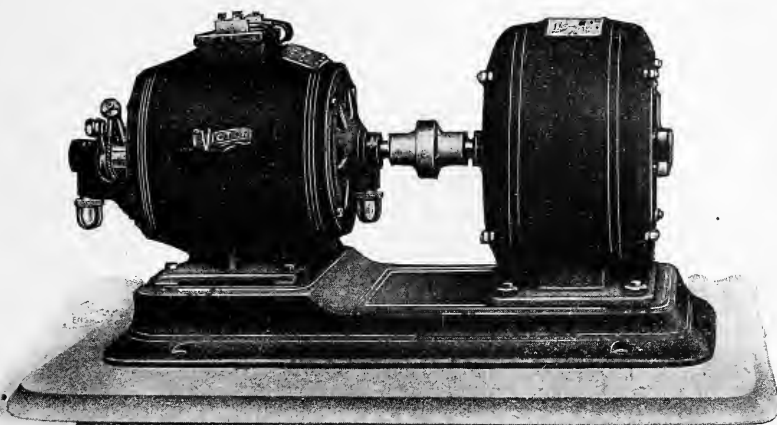


This rheostat is the best known for the perfect control of the direct current motor.

It picks up its load on the first button and as each button is passed with the lever, the motor gradually gains in speed. When the current is cut off from the line, the lever immediately springs back to the starting point, thus making it absolutely impossible for the motor to start unless the lever is again thrown on the starting button.

No. 548. Price\$9.00

Direct Connected Motor Dynamo Outfit for Transforming Alternating to Direct Current



As will be apparent at a glance, this outfit consists of an alternating current motor attached by means of a coupling to a direct current generator, the alternating current operating the motor which in turn drives the generator which develops a direct current suitable for operating therapeutic cabinets, shunt controllers, wall cabinets, eye magnets, etc. This generating set has a capacity of one ampere at 110 volts, thus supplying a sufficient volume of current so that practically the same results are obtained in the use of any of our therapeutic cabinets or plates when connected to it as though the 110 volt direct lighting circuit were available.

We wish to call special attention to the coupling used between the motor and the generator. This coupling is so constructed that there is absolutely no metallic connection between the motor and the generator, thus obviating all danger from accidental crossing of outside wires.

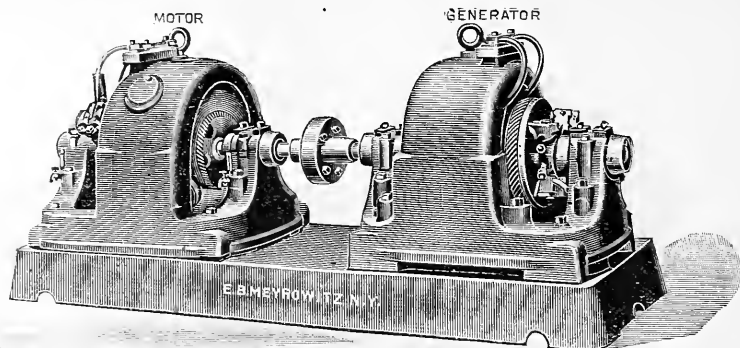
The current generated is even and smooth, closely resembling that which is obtained from battery cells. We would recommend the use of this outfit in preference to the belted type for the reason that there is no difficulty or annoyance from belt slippage, breakage, etc. However, if it is desired to use the motor for some other purpose as well as driving the generator, then it would be necessary to have the motor belted to the generator in place of coupled, and we are prepared to furnish the outfit belted in this way when so ordered.

Where the alternating current only is available we would recommend this outfit as being far more satisfactory than the use of battery cells although the initial cost is somewhat higher. When it is considered that battery cells are a constant source of expense and this outfit will run for years with no expense for repairs aside from a few cents for brush renewals, it is a safe statement to make that in the end the motor generator will prove the cheapest as well as the most satisfactory. Where the motor is used there will be no diminishing of current either in voltage or quantity, even after years of use, whilst in the case of battery cells, deterioration starts at once and causes constant diminishing of the output.

In design and finish this apparatus is fully up to our usual standard and will, therefore, not prove disappointing.

No. 549.	Price for 60 cycle alternating current	\$ 90.00
No. 550.	Price for 125 and 133 cycle alternating current	105.00

Alternating to Direct Current Outfit

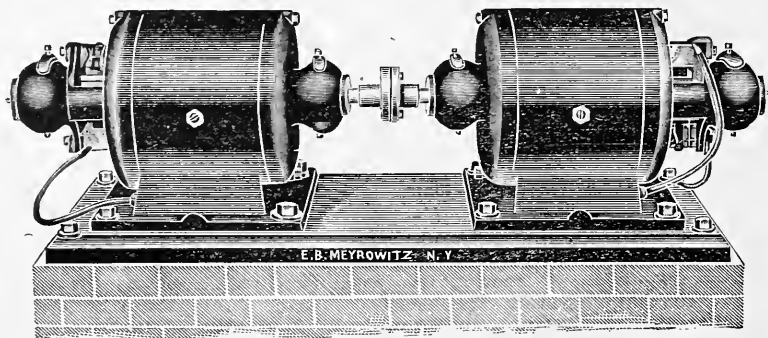


As the 110-volt direct current is the ideal current for nearly all classes of work which would interest the physician, we have introduced our Alternating Current to Direct Current Outfit shown above.

No.	Price with 2 H. P. Motor	.9 K. W. Generator.		
No. 551.			60 Cycle	\$300.00
" 552.	" 3	" 1.8	104 Volts.....	375.00
" 553.	" 4	" 2.2	One Phase	450.00
" 554.	" 2	" .9	60 Cycle	325.00
" 555.	" 3	" 1.8	208 Volts.....	400.00
" 556.	" 4	" 2.2	One Phase.....	475.00
" 557.	" 2	" .9	133 Cycle	375.00
" 558.	" 3	" 1.8	104 Volts.....	425.00
" 559.	" 4	" 2.2	One Phase.....	500.00

For currents of other frequencies prices of apparatus will not exceed those listed under the 133 cycle rates. We can furnish motor-generator apparatus for the following alternating currents: 25, 30, 40, 50 and 75 cycle, in one, two or three phase.

500 Volt to 110 Volt Direct Current Generator



It is often convenient to connect with the trolley circuit of 500 volt direct current, for in some cities this voltage is used for power service. Cut illustrates our Motor-Generator for changing this current to that of 110 volt.

The feature of superiority over other makes is the way in which two machines are combined. It is a well-known fact that the voltage of the trolley current often varies from 450 to 600, and as the field windings of the generator are connected directly with the line a more uniform output is the result.

No. 560.	Price of apparatus with an output of 550 watts.....	\$200.00
No. 561.	Price of apparatus with an output of 1100 watts.....	300.00
No. 562.	Price of apparatus with an output of 2200 watts.....	380.00

Up-to-Date Books, Carefully Selected, which the Electro-Therapeutist and X Ray Worker will Greatly Appreciate



HE selection has been made with great care, so that the field of physical therapy is thoroughly covered, and the physician will find that the books absolutely explain all details and the instructions given are so simple and logical that he will readily understand and know just what to do in each case undergoing treatment with the various apparatus that he may wish to use. The successful practitioner should possess a copy of each.

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No. 582. For a monthly magazine giving the daily experiences of competent men in electro-therapy we highly recommend the Journal of Advanced Therapeutics, published by A. L. Chatterton & Co., New York. We will accept your subscription.	

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WE quote the prices in this catalogue low, and on strictly cash basis. We are, however, prepared to allow a special 5 per cent. discount from these prices if cash accompanies the order. Same discount will be allowed on C. O. D. shipments, but no goods are sent C. O. D. unless one-third of purchase price is remitted with order.

New customers who desire to open accounts are requested to furnish us satisfactory business references, as they will thereby avoid the necessary delay in filling orders.

Please remit in Chicago or New York exchange or in express or postoffice money order. Chicago banks will not accept checks on your local bank at par.

All glassware is shipped at the risk of the buyer. It is therefore advisable to insure tubes against breakage during transportation, and we are prepared to insure these goods at the rate of 5 per cent. of catalogue price.

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